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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	mm	millimeter(s)
ADP	adenosine diphosphate	mOsm	milliosmolar; milliosmeter(s)
AMP	adenosine monophosphate	msec	millisecond(s)
amp	ampere	mV	millivolt(s)
ATP	adenosine triphosphate	min	minute(s)
A	angstrom	MTD	maximum tolerated dose
BSP	sulfobromophthalein	NAD	nicotinamide adenine dinucleotide
C	degrees centigrade	NADH	reduced nicotinamide adenine dinucleotide
cal	calories	NADP	nicotinamide adenine dinucleotidephosphate
cc	cubic centimeter	NADPH	reduced nicotinamide adenine dinucleotidephosphate
cm	centimeter(s)	ng	nanogram (10^{-9})
dl	deciliter	nm	nanometer(s)
DNA	deoxyribonucleic acid	Pa	ambient pressure
ED_{50}	median effective dose(s)	PAS	periodic acid - Schiff
EDTA	ethylenediamine tetraacetic acid	pg	picogram (10^{-12})
e.g.	for example	pgEq	picogram equivalent(s)
EEG	electroencephalogram	p.o.	orally
ESR	erythrocyte sedimentation rate	ppb	parts per billion
g	gram(s)	ppm	parts per million
µg	microgram(s)	r	Roentgen
Hz	Hertz	RBC	red blood cells (erythrocytes), red blood count
hr	hour(s)	resp.	respectively
i.m.	intramuscular	RNA	ribonucleic acid
i.p.	intraperitoneal	s.c.	subcutaneous
IU	international unit(s)	sec	second(s)
i.v.	intravenous	SGOT	serum glutamic-oxalacetic transaminase
kcal	kilocalorie(s)	SGPT	serum glutamic-pyruvic transaminase
kg	kilogram(s)	U	unit(s)
K_m	Michaelis constant	UV	ultraviolet
LD_{50}	median lethal dose(s)	V	volt
LDH	lactic acid dehydrogenase	WBC	white blood cells (leukocytes), white blood count
m	meter(s)	yr	year(s)
M	molar; mole(s)		
mM	millimolar; millimole(s)		
µM	micromolar; micromole(s)		
ma	milliampere(s)		
mCi, µCi	milli-, microcurie(s)		
mEq	milliequivalent(s)		
mg	milligram(s)		
ml, µl	milli-, microliter(s)		

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

0001 A SCANNING ELECTRON MICROSCOPIC STUDY ON ENDOTHELIAL CELLS AND KUPFFER CELLS IN RAT LIVER SINUSOIDS. (Eng.) Muto, M. (Niigata Univ. Sch. Medicine, Niigata, 951 Japan). *Arch. Histol. Jpn.* 37(5):369-386; 1975.

The results of a scanning electron microscopic (SEM) study on endothelial cells (EC) and Kupffer cells (KC) of liver sinusoids obtained from seven adult white rats and a newborn rat are presented. EC lining the sinusoids showed numerous intracellular openings (large, 1-3 μm and small pores, less than 0.1 μm). Stomata of various sizes were also found between the cells. At the junctional parts of a sinusoid with both a central vein and a portal canal, only the small pores were found. The large pores occurred in the main, intermediate portion of the sinusoid, and the space of Disse was widely continuous through them to the sinusoidal lumen. KC were numerous in the periportal area and showed surface morphology different from EC. Numerous cytoplasmic processes projected from the surface of these cells and were classified into three types: 1) thick, horizontal cytoplasmic processes, 2) microvillous processes, and 3) filo- and lamellipodia. Microvillous processes densely covered the surface of the cell. Filopodia radiated from the margin of the cell and attached to the surface of the adjacent EC. Lamellipodia were observed spreading widely on the surface of the sinusoidal wall. The KC generally were seen on a large endothelial opening anchored to the margin by the filopodia. A filopodial communication between adjacent KC was also demonstrated. KC closely resembled in structure the macrophage cultured *in vitro*. The author suggests that KC are macrophages of the liver that have been incorporated in the formation of the sinusoidal wall.

0002 LYMPHOID CELLS IN CHICKEN INTESTINAL EPITHELIUM. (Eng.) Bjerregaard, P. (Praestevangen 29, DK-3460 Birkerod, Denmark). *Cell Tiss. Res.* 161(4):485-495; 1975.

The intraepithelial lymphoid cells of chicken small intestine were studied by light microscopy (using 1 μ Epon sections) and electron microscopy. There were three cell types: small lymphocytes, large lymphoid cells, and granular cells. These corresponded to the previously described theliolymphocytes and globule leukocytes. The numbers of all cell types increased with age. Correlation was found between the number of small lymphocytes and large lymphoid cells, but not between granular cells and either of the other two. It is proposed that the small intraepithelial lymphocyte is an antigen-sensitive cell. Stimulation by absorbed antigens may either trigger cellular immunity or cause the cell to wander into the lamina propria, where T-B cell cooperation takes place and an immunoglobulin A synthesizing plasma cell is formed.

0003 IDENTIFICATION AND ISOLATION OF BASOLATERAL PLASMA MEMBRANES FROM INTESTINAL EPITHELIAL CELL SHEETS [Abstract]. (Eng.) Lewis, B. A.; Elkin, A.; Michell, R. H.; Coleman, R. (Dept. Biochemistry, Univ. Birmingham, P.O. Box 363, Birmingham B15 2TT, U.K.). *Biochem. Soc. Trans.* 3(5): 754; 1975.

0004 EFFECTS OF DIGESTIVE HORMONES ON THE EPITHELIUM OF THE MICE ILEUM: HISTOCHEMICAL AND ULTRASTRUCTURAL STUDIES [Abstract]. (Eng.) Balas, D.; Frexinos, J.; Ribet, A. (Hopital Purpan, F-31052 Toulouse Cedex, France). *Digestion* 10(3): 211-212; 1974.

0005 THE EFFECTS OF MICROWAVES ON THE STRUCTURE OF MITOCHONDRIA IN THE LIVER AND KIDNEYS. (Ukr.) Faitelberg-Blank, V. R.; Shapovalova, L. A. (Odessa Agricultural Inst., Odessa, USSR). *Dopov. Akad. Nauk Ukrainsk. RSR* [*B*] (7):651-654; 1975.

0006 ELECTRON MICROSCOPE STUDY OF THE LIVER IN EXPERIMENTALLY PROLONGED CRUSHING SYNDROME. (Rus.) Nebolsina, L. M. (A. N. Natishvili Inst. Experimental Morphology, Acad. Sci. Georgian SSR, USSR). *Soobshch. Akad. Nauk Gruzinsk. SSR* 78(3):717-720; 1975.

0007 HISTOLOGICAL, HISTOENZYMATIC AND BIOCHEMICAL INVESTIGATION OF THE LIVER AND SMALL INTESTINE OF RATS FOLLOWING A SHORT PERIOD OF FASTING. (Rus.) Krystev, L.; Apostolov, I.; Polyakova-Krysteva, O.; Pramatarova, A.; Stefanova, M. (Hygiene Center, Acad. Medicine, Sofia, Bulgaria). *Vopr. Pitan.* (2):3-8; 1975.

0008 CHROMATOGRAPHIC AND IMMUNOLOGICAL DIFFERENCES IN COMPOSITION AND ORIGIN OF GASTRIC GLYCOPROTEINS IN MAN [Abstract]. (Eng.) Glass, G. B. J.; Badurski, J. E.; Ito, H. (New York Medical Coll., New York, NY). *Clin. Res.* 23(3):439A; 1975.

See also, 0069, 0087, 0132, 0183, 0264, 0370, 0498, 0499.

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0C 0 THE ROLE OF THE LATERAL INTERCELLULAR SPACES IN THE CONTROL OF ION PERMEATION ACROSS THE RABBIT GALL BLADDER. (Eng.) Wiedner, G.; Wright, E. M. (Univ. California Medical Center, Los Angeles, CA). *Pfluegers Arch.* 358(1):27-40; 1975.

The role of the lateral spaces in the control of the passive ion permeation across the rabbit gallbladder was studied. Rabbit gallbladders were mounted as flat sheets between two lucite half chambers. Ion selectivity was estimated from NaCl dilution potentials and from CsCl/NaCl bi-ionic potentials. In 11 gallbaldders studied, the average mucosal NaCl dilution potential difference was 9.25 mV, mucosa positive, and the average conductance was 30.8 mOhms/cm^2. When NaCl in the serosal solution was reduced to 74 mM (from 148 mM), there was a rise in the transmural electrical potential, opposite in polarity to the mucosal dilution transmural electrical potential, with a half time for the build-up of 35 sec. The potential difference remained stable as long as the salt gradient was maintained, and it returned to the original baseline value when the initial composition of the serosal solution was restored. When NaCl in the mucosal fluid was replaced with CsCl, the potential difference rose to a peak, and then slowly declined to a steady state value with a half time of 30 sec. Restoring NaCl to the mucosal fluid caused a rapid fall to the transmural potential difference, and an actual overshoot before it returned to baseline value. In eight gallbladders, the peak and steady-state mucosal CsCl/NaCl potential bi-ionic differences were 6.9 and 4.8 mV, resp. Sucrose (300 mM) was added to the mucosal fluid to close the lateral spaces. The resistance increased by a factor of 2.7. NaCl dilution potentials, CsCl/NaCl and LiCl/NaCl bi-ionic potentials were recorded in the presence of sucrose in the mucosal fluid, in the serosal fluid, or in both. The 2:1 NaCl dilution potential difference was 10.9 mV initially and 10.1 mV at the conclusion of the experiments, whereas the CsCl/NaCl bi-ionic potential difference was 8.3 mV (peak) and 5.5 mV (steady state) initially, and 8.3 and 6.1 mV, resp., at the conclusion. Only sucrose in the mucosal solution produced any change in either the NaCl dilution potential difference or the CsCl/NaCl bi-ionic potential difference. Sucrose in the serosal solutions, or in both fluids did not significantly alter either the bi-ionic dilution or potential differences. These data indicate that both the magnitude and selectivity of cation permeation across the rabbit gallbladder epithelium depends upon the status of the lateral intercellular spaces.

0010 ACTIVE TRANSPORT OF IRON TO MUCOSAL SURFACE OF RAT JEJUNUM. (Eng.) Guy, M. J.; Schachter, D. (Columbia Univ. Coll. Physicians Surgeons, New York, NY 10032). *Am. J. Physiol.* 229(3);790-796; 1975.

Steady-state fluxes of divalent Fe across rat intestinal segments were studied *in vitro*. Segments of the distal small intestine transported the mineral against electrochemical potential gradients from the serosal to the mucosal surface. Active transport in the reverse direction was confirmed with segments of proximal duodenum. The distal mechanism was dependent on cellular metabolism and was markedly decreased by metabolic inhibitors or in the absence of a metabolizable hexose. Cycloheximide also blocked the active transport. Perfusion of jejunal and duodenal intestinal loops *in situ* in anesthetized rats provided evidence that endogenous Fe can be transferred to the lumen by a process other than shedding of mucosal cells. It is suggested that such transfer may occur via the active transport mechanism.

0011 ABSORPTION OF DISACCHARIDES IN RATS FED A PROTEIN-DEFICIENT DIET. (Eng.) Leichter, J.; Adams, J. L. (Univ. British Columbia, Vancouver, B.C., Canada V6T 1W5). *Nutr. Rep. Int.* 12(5):311-316; 1975.

Wistar rats (~ 110 g) were maintained on either a 0.5% protein diet or a control diet containing 18% protein for an 8-week period to study the effect of prolonged protein deficiency on intestinal disaccharide absorption. The animals fed the protein-deficient diet lost about 40% of their original body weight, developed bald patches, and became less active. The *in vivo* absorption of radioactive lactose, sucrose, and maltose was higher in the protein-deficient group, the difference being statistically significant only for lactose and maltose absorption ($p < 0.01$). The intestines of the protein-deficient animals were considerably thinner and smaller in diameter compared with the controls, but the total yield of mucosal scrapings per gram of intestine was only slightly greater for the control animals. The results demonstrate that prolonged feeding of protein-deficient diets to growing rats does not interfere with intestinal disaccharide absorption.

0012 STIMULATION OF WATER AND SODIUM SECRETION AND INHIBITION OF GLUCOSE ABSORPTION FROM THE RAT JEJUNUM DURING INTRAARTERIAL INFUSIONS OF PROSTAGLANDINS. (Eng.) Coupar, I. M.; McColl, I. (Dept. Physiology, Monash Univ., Clayton 3186, Australia). *Gut* 16(10):759-765; 1975.

The effect of prostaglandins, isoprenaline, and dibutyryl cyclic AMP (dibut cAMP) on the net transfer of water, Na^+, and glucose absorption were studied in anesthetized male Wistar rats. The lumen of the jejunum was recirculated with a solution of normal saline containing D(+)glucose and 5.6 mM phenosulphonphthalein. The superior mesenteric artery was perfused extracorporeally and drugs were infused into the arterial blood. Prostaglandin E_1 (PGE_1) at infusion rates of 2.5×10^{-9} and 10^{-8} mol/min induced a net secretion of water and Na^+ significantly different from the infused control mean. Both water and Na^+ secretion were dose-related. PGE_1 induced slight but significant inhibition of glucose absorption at 10^{-8} mol/min. This could either be a direct effect or secondary to solvent drag. PGE_2 (2.5×10^{-9} mol/min) and $PGF_{2\alpha}$ (8×10^{-9} mol/min) induced water and Na^+ secretion, and inhibited glucose absorption but not significantly. Isoprenaline (10^{-9} mol/min) and dibut cAMP (8×10^{-9} mol/min) did not alter water, Na^+, or glucose absorption. The authors conclude that the small inhibitory effect of prostaglandins on glucose absorption in the rat jejunum does not appear to be due to alteration in blood glucose concentration or to their vasoactive effects.

0013 A STUDY OF RELATIONS BETWEEN THE ABSORPTION OF AMINO ACIDS, DIPEPTIDES, WATER AND ELECTROLYTES IN THE NORMAL HUMAN JEJUNUM.

(Eng.) Silk, D. B. A.; Fairclough, P. D.; Park, N. J.; Lane, A. E.; Webb, J. P. W.; Clark, M. L.; Dawson, A. M. (St. Bartholomew's Hosp., London EC1A 7BE, England). *Clin. Sci. Mol. Med.* 49(5):401-408; 1975.

A double-lumen perfusion technique was used to study the effect of a wide range of concentrations of glycyl-L-alanine (10-140 mM) and its constituent amino acids on water and electrolyte absorption from iso-osmotic solutions in the upper jejunum of 27 normal human subjects. Ten subjects perfused with sodium chloride (150 mM) served as controls. There was no significant absorption of water and electrolytes from sodium chloride solution (150 mM), but the presence of the dipeptide or its constituent amino acids stimulated water and electrolyte absorption. Water absorption reached a peak at increasing amino acid and dipeptide concentrations and then tailed off. The data suggest that the tailing off is not solely due to the diminished sodium content of the solutions. During perfusion of the dipeptide-sodium chloride and amino acid-sodium chloride solutions, solute and water were absorbed as an iso-osmotic solution. Analysis of the results indicates that this could occur at high dipeptide concentrations only if the majority of the dipeptide enters the cell intact.

0014 STUDIES ON THE NATURE OF COMPLEXES FORMED BY COPPER WITH HUMAN ALIMENTARY SECRETIONS AND THEIR INFLUENCE ON COPPER ABSORPTION IN THE RAT.

(Eng.) Gollan, J. L. (Royal Free Hosp., Pond St., Hampstead, London NW3 2QG, England). *Clin. Sci. Mol. Med.* 49(3):237-245; 1975.

The nature of copper-binding components in human gastrointestinal secretions and their influence on absorption of the metal were studied. Saliva and gastric juice from 10 normal subjects were analyzed as well as saliva from 4 patients and gastric juice from 5 patients with Wilson's disease. Human gastrointestinal secretions formed soluble copper complexes when labeled *in vitro* with ^{64}Cu. Copper-binding substances of low molecular weight were demonstrated in the saliva, gastric juice, and secretin-stimulated duodenal aspirate of normal subjects by dialysis and gel-chromatography studies. The nature of copper complexes formed by secretions obtained from all patients with Wilson's disease was similar to that of complexes formed by secretions of normal subjects. Bile contained a copper-binding fraction of high molecular weight that was more concentrated in gallbladder than hepatic bile. This component (pH 5-8) had a greater binding affinity for copper than the other alimentary secretions or EDTA at a concentration of 10 mM. Absorption of ^{64}Cu from ^{64}Cu-labeled saliva, gastric juice, or L-histidine solution (100 mM) administered intraduodenally into groups of Lister rats was similar to that observed in a control series given [^{64}Cu]cupric acetate in sodium chloride solution. In contrast, the absorption of ^{64}Cu from labeled hepatic and gallbladder bile was significantly reduced. The results suggest that dietary copper forms soluble complexes with the alimentary secretions and that these complexes influence absorption of the metal according to their molecular size. The net uptake of ingested copper from the gut lumen may represent a balance between the influence of dietary chelates, low-molecular-weight ligands in the alimentary secretions, and a macromolecular copper-binding complex of bile.

0015 ISOLATION AND PROPERTIES OF THE MIXED LIPID MICELLES PRESENT IN INTESTINAL CONTENT DURING FAT DIGESTION IN MAN.

(Eng.) Mansbach, C. M.; Cohen, R. S.; Leff, P. B. (Veterans Admin. Hosp., Durham, NC 27710). *J. Clin. Invest.* 56(4):781-791; 1975.

The evaluation of physicochemical characteristics of human fat digestion was facilitated by a method that allowed characterization of the bile acid-lipid mixed micelles of the aqueous phase of postprandial duodenal fluid. Duodenal fluid was collected from six subjects who had eaten a 36-g fat breakfast for two 90-min periods and for 45 min after i.v. cholecystokinin (75 Ivy U) infusion. The samples were ultracentrifuged at 15,400,000 x *g*-min, the aqueous phase was isolated and passed through a 220-nm filter. The mixed micelles were concentrated by an ultrafiltration procedure using a 1.5-nm filter. The 1.5-nm retentate was eluted from Sepharose 6B columns with 1.5-nm filtrate for both pre-equilibration fluid and eluent. The 1.5-nm filtrate approximated the monomer concentrations. Each sample was assayed for bile acid, fatty acid, lecithin, lysolecithin, protein, cholesterol, and counterions (pH, Na^+, K^+, Ca^{2+}). Constituents were concentrated only on the 1.5-nm filter. On gel permeation chromatography, coincident peaks were observed for bile acid, fatty acid, lysolecithin, and cholesterol, and were eluted with a *Kav* range of 0.50-0.68 (corresponding to a Stokes radius of 2.3-3.5 nm). An average density of 1.25 and coincident peaks of bile acid and fatty acid were found for the mixed micelles on sucrose density gradients. The regression lines of micellar fatty acid, lysolecithin, and cholesterol versus bile acid gave a stoichiometry of 1.4 M fatty acid, 0.15 M lysolecithin, and 0.06 M cholesterol for each mole of bile acid. Mixed micelles were homogeneous in composition. These results provide direct evidence for the existence of the postprandial mixed micelle.

0016 THE EFFECT OF FRUSEMIDE ON WATER AND ELECTROLYTE ABSORPTION FROM THE HUMAN JEJUNUM.

(Eng.) MacKenzie, J. F.; Cochran, K. M.; Russell, R. I. (Royal Infirmary, Glasgow G4 OSF, Scotland). *Clin. Sci. Mol. Med.* 49(5):519-521; 1975.

The effect of frusemide (4-chloro-*N*-furfuryl-5-sulamoylanthranilic acid) on water and electrolyte absorption in the jejunum of 12 normal subjects and its relation to diarrhea were studied. Using a double-lumen perfusion system with proximal occluding balloons, 120 nM (40 mg, i.v.) frusemide significantly reduced the absorption of water and electrolytes from the jejunum. Net secretion of water and electrolytes occurred in some subjects. No significant change in water and electrolyte absorption was observed with 60 nM (20 mg) of frusemide. The results demonstrate an alteration in transport mechanisms in the human jejunum and may explain the diarrhea that occurs in some patients when given high doses of frusemide.

0017 THE EFFECTS OF UNDERNUTRITION AND ITS RELIEF ON INTESTINAL CALCIUM TRANSPORT IN THE RAT. (Eng.) Adams, P. H.; Hill, L. F.; Wain, D.; Taylor, C. (Royal Infirmary, Manchester, England). *Calcif. Tissue Res.* 16(4):293-304; 1974.

Active transport of calcium across the duodenum was measured *in vitro* in 36 normal Wistar rats and in rats during undernutrition and subsequent rehabilitation. In rats growing normally, duodenal calcium transport was an inverse function of age and the length and mineral concentration of the femur. Duodenal calcium transport was reduced during undernutrition (31 rats) and was stimulated when the undernutrition was relieved (21 rats). Calcium transport was not related to age or to the size and composition of the femur during undernutrition and rehabilitation. Calcium transport across the duodenum was a direct function of rate of growth. This finding supports the view that calcium absorption is related to the needs of the organism at the time. Duodenal calcium transport, which was reduced in slowly growing rats, both undernourished and normal, could be stimulated with small amounts of 1,25-dihydroxycholecalciferol (1,25-DHCC, 5 or 25 ng, i.v.) but not with large amounts of cholecalciferol (5.0 μg, i.v.) or 25-hydroxycholecalciferol (2.5 μg, i.v.). These findings may suggest that the growth rate of the body has a bearing on the production of and/or metabolism of 1,25-DHCC.

0018 CHLORIDE MOVEMENT ACROSS MONOLAYERS OF ENRICHED POPULATIONS OF ISOLATED EPITHELIAL CELLS FROM THE MOUSE GASTRIC MUCOSA. (Eng.) Munro, D. R.; Romrell, L. J.; Coppe, M. R.; Ito, S. (Harvard Medical Sch., Boston, MA 02115). *Exp. Cell Res.* 96(1):69-76; 1975.

The abilities of monolayers of mouse epithelial gastric parietal cells and other gastric epithelial cell types to transport chloride were tested with respect to the direction of the current flow used to polarize the cells. Enriched, viable populations of large parietal cells were separated from the smaller cells (surface mucous, mucous neck, chief, and endocrine cells) of the gastric mucosa of five CD-1 mice by pronase digestion and velocity sedimentation. These enriched cell populations were allowed to form a layer on Teflon Millipore filters mounted in lucite chambers. The interface formed by the Millipore filters separated compartments designated "luminal" and "interstitial." The luminal and interstitial phases each contained 5 ml of the same balanced salt solution. The cell populations were polarized by applying a potential difference of approximately 50 mV across the interface while the cells were forming a layer on the filter. Analysis of the luminal and interstitial solutions after 2 hr demonstrated that polarized parietal cell monolayers transported chloride toward the cathode, whereas the similarly polarized small cell monolayers always moved chloride toward the anode. When similar populations of cells were not polarized with an external potential difference, any net chloride movement that occurred was random. The results demonstrate the physiologic polarization of monolayers of parietal mouse gastric mucosal cells with respect to the direction of current flow and their ability to transport chloride.

0019 EFFECTS OF THEOPHYLLINE ON Na AND ALANINE TRANSPORT ACROSS ISOLATED RABBIT ILEUM. (Eng.) Fromm, D.; Field, M. (Harvard Medical Sch., Boston, MA 02215). *Am. J. Physiol.* 229(3):683-688; 1975.

The possibility that in the presence of secretion both unidirectional sodium fluxes contain large nondiffusional components was studied in isolated male New Zealand rabbit ileum using theophylline (10 mM). Addition of theophylline to the ileal mucosa caused a persistent increase in short-circuit current (SCC) and a persistent decrease in DC conductance. Under short-circuit condition, net Na flux (J^{Na}_{net}) was reversed by theophylline from absorption to secretion (-0.6 μEq/hr cm^2) and was due to a decrease in unidirectional mucosal-to-serosal flux (J^{Na}_{ms}). Addition of L-alanine (5 mM) to theophylline-treated mucosa increased SCC, J^{Na}_{net}, and J^{Na}_{ms}. Theophylline reduced J^{Ala}_{net} by 25%. Na flux ratios, in the presence of theophylline at +26 and -11 mV (mucosal reference), differed from flux ratios expected for a diffusional process by less than 8%. In contrast, Na flux ratios, determined in the absence of theophylline and the presence of glucose (3 mM) at +26 and 0 mV, differed from diffusional ratios by 35%. The results are consistent with the hypothesis that theophylline inhibits active Na absorption, but do not conclusively demonstrate the diffusional nature of unidirectional Na fluxes in the presence of theophylline.

0020 DUODENAL IRON TRANSPORT AND IRON BINDING PROTEINS IN PREGNANT AND IRON DEFICIENT RATS [Abstract]. (Eng.) Batey, R. G.; Gallagher, N. D. (Royal Prince Alfred Hosp., Sydney, NSW, Australia). *Aust. N.Z. J. Med.* 5(4):398-399; 1975.

0021 BLOOD FLOW AND WATER EXCHANGE ACROSS FORESTOMACH EPITHELIUM [Abstract]. (Eng.) Sellers, A. F. (New York State Veterinary Coll., Ithaca, NY). *Mayo Clin. Proc.* 50(9):535-536; 1975.

0022 ENHANCEMENT OF INTESTINAL ABSORPTION OF ETHANOL BY AMINO ACIDS [Abstract]. (Eng.) Broitman, S. A.; Vitale, J. J.; Gottlieb, L. S.

(Mallory Inst. Pathology, Boston, MA). *Clin. Res.* 23(3):458A; 1975.

0023 A FIVE HOUR FAT ABSORPTION TEST [Abstract]. (Eng.) Nasrallah, S. M.; Turjuman, N.; Alkhalidi, U. A. S. (Amer. Univ. Beirut, Beirut, Lebanon). *Clin. Res.* 23(3):440A; 1975.

0024 EFFECTS OF PANCREATIC SECRETAGOGUES ON CALCIUM TRANSPORT IN ISOLATED PANCREATIC ACINAR CELLS [Abstract]. (Eng.) Christophe, J.; Conlon, T. P.; Gardner, J. D. (Natl. Inst. Health, Bethesda, MD). *Clin. Res.* 23(3):247A; 1975.

0025 EFFECT OF ETHANOL INGESTION ON SMALL INTESTINAL PHOSPHORUS AND CALCIUM ABSORPTION. (Eng.) Krawitt, E. L. (Dept. Medicine, Univ. Vermont, Burlington, VT). *Clin. Res.* 23(3):252A; 1975.

0026 FURTHER STUDIES USING CARBAMATE ESTERS AS MODEL COMPOUNDS TO INVETIGATE [SIC] THE ROLE OF LIPOPHILICITY IN THE GASTROINTESTINAL ABSORPTION OF FOREIGN COMPOUNDS. (Eng.) Houston, J. B.; Upshall, D. G.; Bridges, J. W. (Sch. Pharmacy, State Univ. New York, Buffalo, NY 14214). *J. Pharmacol. Exp. Ther.* 195(1):67-72; 1975.

0027 THE LACK OF EFFECT OF PENTAGASTRIN ON INTESTINAL CALCIUM ABSORPTION IN THE RAT. (Eng.) Swaminathan, R.; Winter, M.; Care, A. D. (Dept. Animal Physiology and Nutrition, Univ. Leeds, Leeds LS2 9 JT, England). *Horm. Metab. Res.* 7(3): 273; 1975.

0028 FACTORS INFLUENCING ABSORPTION AND EXCRETION OF DRUGS. IV. EFFECT OF HYPERTONIC AND HYPOTONIC SOLUTIONS ON IN SITU RAT INTESTINAL ABSORPTION OF SEVERAL DRUGS. (Eng.) Kohima, S.; Miyake, J. (Faculty Pharmaceutical Sci., Kumamoto Univ., 5-1, Oehon-machi, Kumamoto, Japan). *Chem. Pharm. Bull. (Tokyo)* 23(6):1247-1255; 1975.

0029 REACTION BETWEEN ATPase FROM MITOCHONDRIA AND PHOSPHOLIPID MICELLES: INDUCTION OF HYDROGEN ION TRANSPORT. (Rus.) Evtodienko, Iu. V.; Iaguzhinskii, L. S. (Inst. Bioorganic Chemistry, Pushchino-na-Oke, USSR). *Dokl. Akad. Nauk SSSR* 223 (4):1005-1006; 1975.

0030 CURRENT CONCEPTS ON ABSORPTION OF DIETARY IRON (LITERATURE REVIEW). (Rus.) Gurvich, M. I. (I. P. Pavlov 1st Leningrad Medical Inst., Leningrad, USSR). *Vopr. Pitan.* (3):40-44; 1975.

0031 EFFECT OF ANISOLE, ANETHOLE, BUTYLHYDROXYANISOLE AND SAFROLE ON INTESTINAL ABSORPTION IN THE RAT. (Fre.) Fritsch, P.; Lamboeuf, Y.; de Saint Blanquat, G. (INSERM U-87, Universite Paul Sabatier, Institut de Physiologie, 2, Rue Francois Magendie, 31400 Toulouse, France). *Toxicology* 4(3): 341-346; 1975.

0032 EFFECT OF PROSTAGLANDIN E_2 (PGE_2) ON SODIUM AND CHLORIDE TRANSPORT IN RAT JEJUNUM [Abstract]. (Eng.) Declusin, R.; Wall, M.; Whalen, G. (Veterans Admin. Hosp., Milwaukee, WI). *Clin. Res.* 23(3):248A; 1975.

0033 INTESTINAL MUCOSAL CYCLIC GMP: POSSIBLE ROLE IN STIMULATING ACTIVE ION ABSORPTION [Abstract]. (Eng.) Brasitus, T. A.; Kimberg, D. V.; Field, M. (Harvard Medical Sch., Boston, MA). *Clin. Res.* 23(3):391A; 1975.

0034 ACTIVE PTEROYLMONOGLUTAMATE TRANSPORT BY JEJUNAL MUCOSA [Abstract]. (Eng.) Binder, H. J.; Whiting, D. (Yale Univ., New Haven, CT). *Clin. Res.* 23(3):391A; 1975.

0035 TRANSPORT AND HYDROLYSIS OF DIPEPTIDES BY LIVER, MUSCLE AND KIDNEY [Abstract]. (Eng.) Adibi, M.; Krznsik, B. A. (Montefiore Hosp., Pittsburgh, PA). *Clin. Res.* 23(3):391A; 1975.

0036 TRANSPORT CHARACTERISTICS OF PROGRESSIVE DISRUPTION OF THE GASTRIC MUCOSAL BARRIER [Abstract]. (Eng.) Kelly, D. G.; Bugajski, J.; Schlegel, J. F.; Code, C. F. (Mayo Clinic and Mayo Foundation, Rochester, MN). *Mayo Clin. Proc.* 50(9): 531; 1975.

0037 HEPATIC BILE ACID TRANSPORT: EFFECT OF CONJUGATION AND POSITION OF HYDROXYL GROUPS [Abstract]. (Eng.) Hoffman, N. E.; Iser, J. H.; Smallwood, R. A. (Austin Hosp., Heidelberg, Victoria, Australia). *Aust. N.Z. J. Med.* 5(4):393; 1975.

See also, 0063, 0065, 0172.

0038 DISTRIBUTIONS OF SPIKE BURSTS IN CAT DUODENUM. (Eng.) Sancholuz, A. G.; Croley, T. E., II; Glover, J. R.; Macagno, E. O.; Christensen, J. (Dept. Internal Medicine, Univ. Iowa, Iowa City, IA 52242). *Am. J. Physiol.* 229 (4):925-929; 1975.

The histograms of spike bursts over short distances were examined in the isolated duodenum of 16 cats *in vitro* to estimate the dimensions and configurations of single ring contractions. Multiple electrodes were arranged circumferentially and longitudinally. At a single cross section of the duodenum, spike bursts occurred simultaneously in any single slow-wave cycle, but all eight monitored sites in the circumference participated simultaneously only in about 25% of the spike-burst cycles. Wide variations in the incidence of spike bursts at different locations in a planar cross section were also evident. In a longitudinal section, net level of activity over short distances varied widely. Spike bursts were out of phase in the longitudinal axis, appearing to spread caudad; 80% of spike-burst groups involved less than an average of 5.5 consecutive electrode sites (spaced at 5-mm intervals). The sequential appearance in time and the correlation of spike bursts with ring contractions of the circular muscle suggests that such contractions must always be peristaltic. An estimated 80% of such contractions sweep less than about 3 cm. The demonstration of a great degree of variation in activity over very short distances implies that records of spike bursts from a single electrode do not accurately reflect activity beyond that one point site.

0039 PHASE LOCK OF ELECTRICAL SLOW WAVES AND SPIKE BURSTS IN CAT DUODENUM. (Eng.) Sancholuz, A. G.; Croley, T. E., II; Christensen, J.; Macagno, E. O.; Glover, J. R. (Univ. Iowa Coll. Medicine and Engineering, Iowa City, IA 52242). *Am. J. Physiol.* 229(3):608-612; 1975.

The phase relation between slow waves and spike bursts was studied *in vitro* in the duodenums of 11 healthy cats. Electrodes were arranged radially about 10-cm duodenal segments excised 1 cm below the pylorus to the ligament of Treitz. Records were read for T_1, the time between the slow-wave "valley" and the first spike, and T_2, the time between successive valleys. The distributions of the ratio T_1/T_2 showed very small differences, not uniquely attributable to radial electrode position. The distribution of T_1/T_2 indicated that spike bursts began 58.8% of the way through a slow-wave cycle, measured from the valley. Also, electrodes were arranged longitudinally and records were read to determine ΔSW, the slow-wave delay time between adjacent electrode positions, and ΔS, the spike burst delay time between adjacent electrode positions. The correlation of ΔS and ΔSW suggested a linear relation, and a regression resulted in a good linear description. These results are consistent with an assumed phase lock of spike bursts to slow waves.

0040 ELECTRICAL ACTIVITY OF SMALL INTESTINAL SMOOTH MUSCLE AND ITS TEMPERATURE DEPENDENCE. (Eng.) El-Sharkawy, T. Y.; Daniel, E. E. (Mayo Graduate Sch. Medicine, Mayo Foundation, Rochester, MN 55901). *Am. J. Physiol.* 229(5):1268-1276; 1975.

The spontaneous electrical activity of rabbit jejunal longitudinal muscle strips with reference to the configuration of the control potential, the effects of temperature, and their implications regarding the ionic basis and triggering mechanisms of the intestinal control potential were described. The spontaneous electrical activity consisted of two main components: the control activity and the response activity. The control potentials (CP), or slow waves, consisted of repetitive 18 mV depolarizations that lasted 2 sec at 37 C, had a frequency of 18/min, and arose from a membrane potential of -55 mV. In some cells, periods between CP's exhibited "diastolic" progressive depolarizations (intercontrol-potential depolarization), which may be the trigger of the CP in driving cells. While CP was usually monophasic, some cells persistently exhibited a notch early in the plateau phase. It is suggested that CP consists of two components, an "initial depolarization" and a "secondary depolarization," which are usually fused together to give a monophasic potential. Cooling reduced CP frequency and prolonged its duration and caused more cells to show notching. While amplitude and rate of CP initial depolarization had low Q_{10}'s, duration and rates of onset and offset of the secondary depolarization had higher Q_{10}'s. Thus, the process responsible for secondary depolarization is more sensitive to temperature than that underlying initial depolarization of the CP.

0041 ELECTROGENIC SODIUM PUMPING IN RABBIT SMALL INTESTINAL SMOOTH MUSCLE. (Eng.) El-Sharkawy, T. Y.; Daniel, E. E. (Mayo Graduate Sch. Medicine, Mayo Foundation, Rochester, MN 55901). *Am. J. Physiol.* 229(5):1277-1286; 1975.

The electrogenicity of the electrogenic sodium pump was investigated in rabbit jejunal smooth muscle to determine whether this pump is the ionic mechanism underlying the intestinal control potential (slow wave). Potassium admission to Na-rich tissues caused a large increase in membrane potential that decreased after 10-20 min toward values comparable with those of normal tissues. This hyperpolarization far exceeded the K equilibrium potential and could be prevented by cooling or by ouabain treatment (1 x 10^{-5} M). No hyperpolarization occurred upon K admission to Li-rich tissues in the absence of Na. Thus, the pump in this tissue can operate electrogenically. Goldman's equation was modified to account for the pump's contribution to the membrane potential. Using this equation, the calculated contribution of the pump under normal "steady-state" conditions was unlikely to exceed a few millivolts. It is concluded that although the pump in this tissue can be electrogenic, its contribution may be smaller than that required if the intestinal control potential resulted from rhythmic turning off and on of the electrogenic Na pump.

0042 IONIC MECHANISMS OF INTESTINAL ELECTRICAL CONTROL ACTIVITY. (Eng.) El-Sharkawy, T. Y.; Daniel, E. E. (Mayo Graduate Sch. Medicine, Mayo Foundation, Rochester, MN 55901). *Am. J. Physiol.* 229(5):1287-1298; 1975.

The effects of inhibition and stimulation of the electrogenic sodium pump and of altering the ionic environment on the electrical control activity (ECA) were studied in rabbit jejunal smooth muscle. Pump inhibition abolished the ECA at a time when the membrane potential was more negative than the peak depolarization of the control potential (CP). Pump stimulation hyperpolarized the membrane and CP's appeared. Their amplitude was initially small and progressively increased as the hyperpolarization subsided. Lowering external Na to 20 mM or Ca withdrawal, but not addition of verapamil (5×10^{-6} M), reversibly abolished the ECA. Chloride replacement by propionate, isethionate, or benzene-sulphonate caused a transient augmentation, followed by suppression of the secondary depolarization of the CP's and decreased their frequency. The initial depolarization of the CP was little affected. Nitrate substitution increased CP frequency and spiking activity but had no observable effects on the CP configuration. These results suggest that the intestinal control potential may result from conductance changes initially to Na and later to Cl rather than from an oscillatory electrogenic pump.

0043 THE EFFECT OF METOCLOPRAMIDE ON INHIBITION INDUCED BY PURINE NUCLEOTIDES, NORADRENALINE, AND THEOPHYLLINE ETHYLENEDIAMINE ON INTESTINAL MUSCLE AND ON PERISTALSIS IN VITRO. (Eng.) Okwuasaba, F. K.; Hamilton, J. T. (Dept. Pharmacology, Univ. Western Ontario, London, Ontario N6A 5C1, Canada). *Can. J. Physiol. Pharmacol.* 53(5):972-977; 1975.

The interactions between metoclopramide [*N*-(diethylaminoethyl)-2-methoxy-4-amino-5-chlorobenzamide, Mcp] and noradrenalin, theophylline ethylenediamine, ATP, ADP, and adenosine were studied in isolated intestinal preparations and on peristaltic activity in the guinea pig ileum to determine if Mcp effects the action of purine nucleotides. Mcp (0.1 and 1.0 μM) partially and significantly reduced the relaxations induced by ATP, ADP, and adenosine. Mcp was without effect on theophylline ethylenediamine, while it significantly potentiated noradrenalin on the atropine-pretreated (0.1 μM) tenia coli, rabbit ileum, and rat duodenum. Mcp (1.0 μM) decreased the inhibitory effects of ATP, ADP, and adenosine on peristalsis induced in the isolated guinea pig ileum by a constant increase in intraluminal pressure. It did not affect inhibition due to theophylline ethylenediamine, but potentiated inhibition of peristalsis due to noradrenalin. It is proposed that this effect of Mcp may be a specific antagonistic action on receptors sensitive to the putative purinergic transmitters, ATP and ADP, and may be partly responsible for its observed action on peristalsis.

0044 ACTION OF BOMBESIN ON THE MOTILITY OF THE STOMACH. (Eng.) Bertaccini, G.; Impicciatore, M. (Universita di Parma, Istituto di Farmacologia, Ospedale Maggiore, I-43100 Parma, Italy). *Naunyn Schmiedebergs Arch. Pharmacol.* 289 (2):149-156; 1975.

The pharmacological activity of bombesin on the stomach of the rat, dog, and man was studied under different experimental conditions. Bombesin stimulated whole-stomach contractions in female Wistar rats at all times. Blocking of the duodenal effluent during exclusion of the pyloric sphincter was preceded by an intermediate increase in the frequency of the drops of effluent, resulting from stomach wall contraction. Doses of 1-5 ng/kg instilled *in situ* in the rat caused partial duodenal effluent restriction while 100 ng/kg caused a block lasting about 1 hr. While good dose-activity response was seen in some rats, tachyphylaxis was observed in others. The C-terminal nonapeptide of bombesin had a similar effect to that of the parent compound. Cerulein exerted an effect only at the gastroduodenal junction. Heidenhain pouches in mongrel dogs were stimulated only with large doses of bombesin (0.1-0.5 μg/kg); the innervated portion of the stomach was virtually insensitive to doses up to 3 μg/kg. Cerulein, however, produced a constant increase in tone and amplitude with doses from 0.05 to 0.2 μg/kg. Tachyphylaxis was present in all experiments, and the behavior of the C-terminal nonapeptide was identical to that of bombesin. In human isolated stomach muscle strips, bombesin (3-30 ng/ml of bath) stimulated both circular and longitudinal muscle and a good dose/effect relation was found. Infusion of bombesin (10-20 ng/kg/min) during radiological examination produced an increase in tone in the antrum and a simultaneous decrease in tone and motility in the body and fundus. The authors suggest that bombesin has a direct effect on the *in situ* rat stomach and on the isolated preparations, while it has an indirect effect on *in situ* innervated preparations of the dog and man.

0045 INTERACTION BETWEEN OCTAPEPTIDE-CHOLECYSTOKININ, GASTRIN, AND SECRETIN ON CAT GALLBLADDER IN VITRO. (Eng.) Chowdhury, J. R.; Berkowitz, J. M.; Praissman, M.; Fara, J. W. (Albert Einstein Coll. Medicine, Bronx, NY). *Am. J. Physiol.* 229(5):1311-1315; 1975.

The effects of synthetic octapeptide of cholecystokinin (OP-CCK), synthetic human gastrin I, and pure natural and synthetic secretin on isometric tension development in strips of cat gallbladder were studied. Effective molar concentrations were 2.2×10^{-10} to 5.3×10^{-9} for OP-CCK and 1.13×10^{-7} to 1.8×10^{-6} for gastrin. The maximal response to gastrin averaged 66% of the maximal response to OP-CCK, and the effects were not blocked by atropine. Secretin was weakly stimulatory or ineffective by itself. Prior addition of submaximal doses of gastrin shifted the dose-response curve of OP-CCK to the right, but neither the slope nor the calculated maximal response (CMR) was significantly changed, suggesting that gastrin and OP-CCK compete for a common receptor on cat gallbladder. A background dose of secretin shifted the dose-response curves for both OP-CCK and gastrin to the left and increased the slopes significantly with increase in the respective CMR. The combined action of OP-CCK (or gastrin) and secretin are supra-additive. These experiments suggest that OP-CCK and gastrin act at a common receptor site that is different from the secretin-receptor site.

0046 MECHANISM OF ACTION OF PENTAGASTRIN AND ACETYLCHOLINE ON THE LONGITUDINAL MUSCLE OF THE CANINE ANTRUM.

(Eng.) Szurszewski, J. H. (Mayo Medical Sch., Rochester, MN 55901). *J. Physiol. (Lond.)* 252(2):335-361; 1975.

Electrical and mechanical activities of the longitudinal muscle of the dog antrum were recorded with the double sucrose-gap technique. The muscle exhibited spontaneous action potentials that consisted of a spike-like potential (amplitude averaged 23 mV) that, after a brief and partial repolarization, was followed by a negative-going, plateau-type potential (amplitude averaged 17 mV). In 97% of the muscle preparations, no tension changes were produced by spontaneous action potentials. Tetrodotoxin (10^{-5} M), atropine (10^{-5} M), alpha- and beta-adrenoceptor antagonists (phentolamine, 10^{-6} M; phenoxybenzamine, 10^{-6} M; and propranolol, 10^{-6} M, resp.), and H_1 and H_2 receptor blocking agents (mepyramine and metiamide, 10^{-6} M, resp.) had no effect on the action potential. It is concluded that the action potential was myogenic in origin. Steady depolarizing current increased, whereas hyperpolarizing current decreased, the frequency of the action potential. In twelve muscle strips in which length-tension relations were studied, the average resting tension at L_0 was 570 mg. The active force of isometric contraction produced by acetylcholine increased with strip length up to a maximum, then decreased with further increases in length. On smooth muscle, pentagastrin (2×10^{-14} to 10^{-11} M) increased the frequency of the action potential in a dose-dependent fashion. Pentagastrin also released acetylcholine from intramural cholinergic nerves. Acetylcholine produced phasic contractions that were associated with action potentials, and as long as it was present in the bathing solution, it increased the amplitude and duration of the action potential. When acetylcholine and pentagastrin were present together in the solution, phasic contractions occurred at the frequency of the action potential. The results indicate that in the longitudinal muscle of the dog antrum, gastrin increases the occurrence of gastric contraction by releasing acetylcholine from intramural cholinergic nerves and increases the incidence of contraction by acting on smooth muscle to increase and regularize the frequency of the action potential.

0047 EFFECT OF PROSTAGLANDIN-E_2 ON MYOELECTRICAL AND MECHANICAL ACTIVITY OF TOTALLY ISOLATED, EX-VIVO-PERFUSED, CANINE STOMACH.

(Eng.) Kowalewski, K.; Kolodej, A. (Surgical-Medical Res. Inst., Univ. Alberta, Edmonton T6G 2H7, Canada). *Pharmacology* 13(4):325-339; 1975.

The effects of prostaglandin-E_2 (PGE_2) on myoelectrical and mechanical activity of the isolated, homologous perfused canine stomach were studied. Electrical control activity (ECA) was first recorded for 20-30 min prior to administration of the stimulants. A flash injection of 25 µg of PGE_2 into the gastric artery led to production of premature control potentials, uncoupling of ECA, and to a weak mechanical response of short duration. After vagal stimulation of the nerve of Latarjet, or after flash injection of pentagastrin (2.5 µg) or methacholine (5 µg), similar changes in ECA were observed, but mechanical response corresponding to antral contractions was very pronounced. Prolonged infusion of PGE (500 µg/hr) induced a marked increase of ECA frequency. A similar effect on ECA frequency was observed during infusion of pentagastrin (32 µg/hr). Infusion of PGE_2 abolished mechanical response but infusion of pentagastrin stimulated this response. Effects of a flash injection of PGE_2 on electrical activity were reduced by hexamethonium and abolished by tetrodotoxin and atropine. The action of the blocking agents on PGE_2-induced changes in ECA was similar to the action of these blockers on gastric myoelectrical activity, stimulated vagally or by injection of pentagastrin and methacholine. Infusion of PGE_2 induced a marked reduction in gastric peripheral vascular resistance, but no time-correlation between hemodynamic effects of PGE_2 and its action of gastric musculature was noted. The results demonstrate that PGE_2 acts essentially on gastric ECA, but does not induce electrical response activity. This may be explained by the stimulation of longitudinal muscles and the inhibition of circular muscles by PGE_2.

0048 AN ANALYSIS OF THE MECHANICAL RESPONSES OF THE ISOLATED ILEUM TO SINGLE TRANSMURAL STIMULATION AND TO DRUGS.

(Eng.) Ohkawa, H. (Yamaguchi Univ. Sch. Medicine, Ube, Japan) *Bull. Yamaguchi Med. Sch.* 21(1-4):31-45; 1974.

The mechanical responses of the isolated ileum of the guinea pig to single transmural stimulation of the intrinsic nerves and to drugs were studied. Excitatory dominant and inhibitory dominant types of responses were observed. Rebound-contraction produced by single transmural stimulation was also demonstrated. Atropine (10^{-6} g/ml) or hyoscine (10^{-5} g/ml) abolished the primary contraction and produced the relaxation type response. The initial relaxation was dependent on the tension level at which the single transmural stimulation was given. Tetrodoxin, (1.6×10^{-7}g/ml) but not hexamethonium (0.8-1.6×10^{-6} g/ml), inhibited the primary contraction, the initial relaxation, and the rebound-contraction by blocking the activity of the intrinsic nerves. Phenoxybenzamine (10^{-6} g/ml) partly inhibited the initial relaxation, and guanethidine (10^{-5} g/ml) had no effect on it. ATP and ADP potentiated the initial relaxation, suggesting the existence of nonadrenergic inhibitory neurons in the guinea pig ileum. This result suuports the possibility that ATP or a related compound is a transmitter substance released by nonadrenergic inhibitory nerves. The authors conclude that three types of intrinsic nerves are included in the wall of the guinea pig ileum. Rebound-contraction does not appear bo be a nerve-mediated phenomenon. The process of the rebound-contraction may be due to intrinsic mechanism in smooth muscle cells due to the preceding hyperpolarization.

0049 THE EFFECT OF PENTAGASTRIN ON THE GASTRIC EMPTYING OF SOLID FOOD IN MAN [Abstract]. (Eng.) Hamilton, S. G. L.; Sheiner, H. J.; Quinlan, M. F. (Perth Medical Centre, Perth, Western Australia). *Aust. N.Z. J. Med.* 5(4):396; 1975.

0050 DUODENAL-GASTRIC REFLUX CAUSED BY RETROGRADE DUODENAL PACING [Abstract]. (Eng.) Kelly, K. A.; Schlegel, J. F.; Steinbach, J. H.; Code, C. F. (Mayo Clinic and Mayo Foundation, Rochester, MN). *Mayo Clin. Proc.* 50(9):534-535; 1975.

0051 SMALL BOWEL MOTOR INHIBITION FOLLOWING INTRADUODENAL ADMINISTRATION OF OLEIC AND RICINOLEIC ACIDS [Abstract]. (Eng.) Bass, P.; Stewart, J. J. (Center Health Sci., Univ. Wisconsin, Madison, WI). *Mayo Clin. Proc.* 50(9):530; 1975.

0052 INTRACOLONIC PRESSURES DURING PERFUSION IN INTACT MAN [Abstract]. (Eng.) Chauve, A.; Devroede, G.; Bastin, E. (Centre Hospitalier Universitaire, Sherbrooke, Quebec, Canada). *Mayo Clin. Proc.* 50(9):529-530; 1975.

0053 AUTOMATED HIGH-SPEED ANALYSIS OF GASTROINTESTINAL MYOELECTRIC ACTIVITY [Abstract]. (Eng.) Wingate, D. L.; Barnett, T. G.; Green, W. E. R. (London Hosp. Medical Coll., London, England). *Mayo Clin. Proc.* 50(9):529; 1975.

0054 REVERSED SEGMENTS AFTER MASSIVE INTESTINAL RESECTION. IS TRANSIT DELAY HORMONE-MEDIATED [Abstract]? (Eng.) Barros D'Sa, A. A. B.; Kennedy, T. L.; Parks, T. G.; Buchanan, K. D. (Depts. Surgery and Medicine, Queen's Univ., Belfast, Ireland). *Br. J. Surg.* 62(8):656; 1975.

0055 INTEGRATED SOMATOMOTOR, CARDIOVASCULAR AND GASTROINTESTINAL ADJUSTMENTS INDUCED FROM THE CEREBELLAR FASTIGIAL NUCLEUS. (Eng.) Lisander, B.; Martner, J. (Dept. Physiology, Univ. Goteborg, Goteborg, Sweden). *Acta Physiol. Scand.* 94(3):358-367; 1975.

0056 ACTIONS OF GASTROINTESTINAL HORMONES AND RELATED PEPTIDES ON THE MOTOR FUNCTION OF THE BILIARY TRACT. (Eng.) Lin, T.-M. (Lilly Res. Lab., Indianapolis, IN 46206). *Gastroenterology* 69(4): 1006-1022; 1975.

0057 THE RELATIONSHIP BETWEEN GASTRO-OESOPHAGEAL SPHINCTER PRESSURE AND GASTRO-INTESTINAL HORMONE STIMULATION [Abstract]. (Eng.) Calvert, C. H.; Parks, T. G.; Buchanan, K. D. (Dept. Surgery, Queen's Univ., Belfast, Northern Ireland). *Br. J. Surg.* 62(2):156; 1975.

0058 GASTROINTESTINAL ELECTRICAL ACTIVITY: TERMINOLOGY. (Eng.) Sarna, S. K. (Depts. Surgery and Electrical Engineering, McMaster Univ., Hamilton, Ontario, Canada). *Gastroenterology* 68(6): 1631-1635; 1975.

See also, 0081, 0203, 0290, 0395, 0418.

SECRETION AND METABOLISM

0059 STIMULATION OF SECRETION OF GASTRIC INHIBITORY POLYPEPTIDE AND INSULIN BY INTRADUODENAL AMINO ACID PERFUSION. (Eng.) Thomas, F. B.; Mazzaferri, E. L.; Crockett, S. E.; Mekhjian, H. S.; Gruemer, H. D.; Cataland, S. (Ohio State Univ. Hosp., Room N-937, 410 West 10th Ave., Columbus, OH 43210). *Gastroenterology* 70(4):523-527; 1976.

The effect of intraduodenal or i.v. administration of a 30-g mixed amino acid solution on serum gastric inhibitory polypeptide (GIP), α-amino nitrogen (AAN), glucose, and insulin concentrations was studied in 10 normal subjects (6 men and 4 women). A second experiment with 12 normal subjects was conducted to determine the effect of osmolality changes of the duodenal perfusate on serum GIP levels. Initially, an intraduodenal amino acid perfusion (15 ml/min x 60 min) was performed in each subject and was followed in 1-2 weeks by an i.v. infusion. Peak AAN concentrations occurred at 60 min after both routes of administration, but were greater with i.v. infusion, 145 μg/ml versus 89 μg/ml. Although serum AAN levels were significantly lower after intraduodenal administration, incremental insulin concentrations were greater after intraduodenal perfusion, 77.3 μU/ml versus 43.1 μU/ml. Total integrated insulin secretion was also

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greater after intraduodenal amino acids, 5000 versus 2400 μU-min/ml. With i.v. amino acid infusion, serum GIP concentrations remained below the assay detection limit. After intraduodenal perfusion, a mean maximum GIP increment of 468 pg/ml occurred at 15 min. In all subjects peak GIP concentrations occurred at 15 min and preceded the maximum insulin rise by 15-30 min. Total integrated GIP secretion was significantly greater after intraduodenal amino acid perfusion, 13,000 pg-min/ml versus no measurable response with i.v. infusion. In the second study, no significant changes in serum GIP concentrations occurred after intraduodenal perfusion of 0.45% saline, 0.9% saline, or 10% mannitol. The results demonstrate that intraduodenal amino acid administration stimulates the secretion of GIP in association with an augmentation of insulin secretion. The authors suggest that endogenously released GIP may be important in the enteric mediated release of insulin.

0060 POTENCY AND SELECTIVITY OF METHYL ANALOGUES OF PROSTAGLANDIN E_2 ON RAT GASTROINTESTINAL FUNCTION. (Eng.) Main, I. H. M.; Whittle, B. J. R. (Sch. Pharmacy, Univ. London, 29/39 Brunswick Square, London, WC1N 1 AX, England). *Br. J. Pharmacol.* 54(3):309-317; 1975.

The potency and selectivity of action of prostaglandin E_2 and its [15S]- or [15R]-15-methyl and 16,16-dimethyl analogues on gastrointestinal function were studied in the rat. The [15S]-15-methyl and 16,16-dimethyl analogues were 40 times as active as prostaglandin E_2 in inhibiting pentagastrin-stimulated acid secretion on i.v. administration to the anesthetized rat, and 100 times as active on s.c. injection to the chronic fistula rat. In antisecretoy doses, the analogues, like prostaglandin E_2, caused bile reflux and, in higher doses, profuse diarrhea. The [15S]-15-methyl and 16,16-dimethyl analogues were at least 30 times as active as prostaglandin E_2 in causing changes in intestinal intraluminal pressure *in vivo*, but were equipotent on isolated smooth muscle. In equivalent antisecretory doses, the methyl analogues had little effect on systemic arterial blood pressure and resting mucosal blood flow compared with prostaglandin E_2. The [15R]-methyl epimer administered parenterally had little effect on gastrointestinal function, but brief acid incubation greatly increased its activity. The results indicate that in the rat the greatly increased potency of 16,16-dimethyl and [15S]-15-methyl prostaglandin E_2 in inhibiting acid secretion is accompanied by little or no increase in selectivity with respect to intestinal motility.

0061 MORPHOLOGY AND PHYSIOLOGY OF GH-RIH (SOMATOSTATIN) IN THE GASTROINTESTINAL TRACT [Abstract]. (Eng.) Polak, J. M.; Bloom, S. R.; Joffe, S.; Pearse, A. G. E. (Royal Postgraduate Medical Sch., London W12 OHS, England). *Clin. Sci. Mol. Med.* 49(3):26p; 1975.

0062 THE TROPHIC ACTION OF GASTRO-INTESTINAL HORMONES. (Eng.) Barrowman, J. A. (London Hosp. Medical Coll., London E 1, England). *Digestion* 12(2):92-104; 1975.

0063 THE DIGESTIVE AND ABSORPTIVE FUNCTION OF SMALL INTESTINE MUCOSA. (Ger.) Caspary, W. F. (Medizinische Universitatsklinik, 34 Gottingen, Humboldtallee 1, Germany). *Dtsch. Med. Wochenschr.* 100(31):1603-1610; 1975.

0064 SALIVARY SECRETION. (Eng.) Schneyer, L. H.; Emmelin, N. In: Gastrointestinal Physiology, Vol. 4. Edited by E. D. Jacobson; L. L. Shanbour. (Baltimore, Univ. Park Press): 183-226; 1974.

0065 GASTROINTESTINAL MUCOSAL METABOLISM. (Eng.) Sernka, T. J. In: Gastrointestinal Physiology, Vol. 4. Edited by E. D. Jacobson; L. L. Shanbour. (Baltimore, Univ. Park Press): 45-68; 1974.

0066 GASTROINTESTINAL HORMONES. (Eng.) Johnson, L. R. In: Gastrointestinal Physiology, Vol. 4. Edited by E. D. Jacobson; L. L. Shanbour. (Baltimore, Univ. Park Press): 2-43; 1975.

0067 EFFECT OF A DAILY INGESTION OF AN UNSAPONIFIABLE AVOCADO AND SOYA EXTRACT ON CHOLESTEROL METABOLISM IN THE RAT. (Fre.) Chevallier, F.; Lutton, C.; Sulpice, J. C.; D'Hollander, F. (Lab. Physiologie Nutrition, Univ. de Parie-Sud, batiment 447, 91405 Orsay, France). *Pathol. Biol.* 23(3):225-230; 1975.

SECRETION AND METABOLISM

Stomach

0068 Ba^{++} AS A GASTRIC STIMULANT: RELEASE OF HISTAMINE. (Eng.) Rangachari, P. K. (Univ. California Sch. Medicine, San Francisco, CA 94143). *Am. J. Physiol.* 229(3):627-631; 1975.

Ba^{2+} was studied to determine whether it induces acid secretion in the isolated frog stomach by releasing an endogenous substance, and whether its effects on transmucosal resistance can be dissociated from the effect on acid secretion. Ba^{2+} (2mM) added to the serosal solution bathing the resting stomach increased transmucosal resistance and induced acid secretion. The increase in acid secretion was associated with an increased leak of histamine from the mucosa into the serosal solution. Pretreatment with burimamide inhibited the secretory response. After a pulse treatment with 2 mM Ba^{2+} for 5 min, the effects on resistance were transient, but the effects on acid secretion were sustained. A pulse treatment with histamine also led to a sustained increase in acid secretion, and this increase was blocked by burimamide. It is concluded that Ba^{2+} releases histamine, which then stimulates acid secretion.

0069 ULTRASTRUCTURAL AND PHYSIOLOGICAL CHANGES IN PIGLET OXYNTIC CELLS DURING HISTAMINE STIMULATION AND METABOLIC INHIBITION. (Eng.) Forte, T. M.; Machen, T. E.; Forte, J. G. (Donner Lab., Univ. California, Berkely, CA 94720). *Gastroenterology* 69(6):1208-1222; 1975.

Neonatal pig mucosa was studied in order to correlate electrophysiological and secretory parameters with ultrastructural changes in membrane components of oxyntic cells during conditions of rest, histamine-stimulation (5 x 10^{-5} M), and metabolic inhibition effected by anaerobiosis. The nonstimulated tissue had a transmucosal resistance of about 130Ω x cm^2, while the oxyntic cells were characterized by numerous cytoplasmic tubulovesicles and short microvilli extending into patent glandular and canalicular lumina. Upon histamine stimulation, the average rate of H$^+$ secretion was 8.1 μEq/cm^2/hr, and the resistance decreased to 77Ω x cm^2. The changes were coupled with an immense elaboration of the oxyntic cell apical and canalicular surfaces with a concomitant decrease of tubulovesicles. The observed decrease in resistance was correlated to large increases in secretory membrane area. Anoxia inhibited H$^+$ secretion while resistance increased to 211Ω x cm^2. Anoxic oxyntic cells were characterized by swollen mitochondria and occlusion of the lateral intercellular space and basal infoldings. Little change in the configuration of the secretory surfaces was noted, suggesting that restriction of lateral and basal membranes might be responsible for the observed resistance increase. The results confirm previous studies that indicate that profound membrane structural alterations are associated with the secretory and metabolic state of gastric oxyntic cells. The authors propose an electrical analogue of gastric mucosa on the basis of these observations.

0070 DOES PENTAGASTRIN SUPPRESS SECRETIN INDUCED PEPSIN SECRETION IN HEIDENHAIN POUCH DOGS? (Eng.) Magee, D. F.; Nakajima, S. (Creighton Univ. Sch. Medicine, 2500 California St., Omaha, NB 68178). *Experientia* 31(7):821-822; 1975.

Experiments were performed to determine whether pentagastrin could diminish the stimulatory action of secretin or methacholine on Heidenhain pouch pepsin in dogs. Secretin (1 U/min infusion)-stimulated pepsin secretion from Heidenhain pouches was significantly depressed by concomitant pentagastrin (0.5, 1, or 2 μg/min, i.v.) in six dogs. Pentagastrin by itself was without effect on pouch pepsin. Methacholine, (0.5, 1, or 2 U secretin/min superimposed over 2 μg/min methacholine) in 10 dogs, did not antagonize secretin-stimulated pouch pepsin. The authors conclude that in Heidenhain pouches, pentagastrin antagonizes secretin-stimulated pepsin, while secretin and methacholine do not antagonize one another.

0071 GASTRIN RESPONSE TO MEALS OF DIFFERENT COMPOSITION IN NORMAL SUBJECTS. (Eng.) Blair, E. L.; Greenwell, J. R.; Grund, E. R.; Reed, J. D.; Sanders, D.J. (Dept. Physiology, The Univ., Newcastle upon Tyne, England). *Gut* 16(10):766-773, 1975.

Serum gastrin responses and the integrated gastrin responses to eating 3 meals of very different composition were studied in 11 male volunteers on a number of days. Two meals, a milk meal of 500 ml and a breakfast of eggs, toast, butter, marmalade, fruit juice, and coffee, were eaten at breakfast time. The serum gastrin responses to these meals were compared with the concentrations observed when the subjects fasted over the same time of day. A steak meal was eaten at lunch time. There were no significant differences between the mean serum gastrin concentrations to the three meals, but each meal produced a significant increase in serum gastrin above fasting levels. When the prefeeding gastrin concentration was subtracted from the gastrin responses, the integrated responses to the steak meal were greater than those to either of the breakfast meals. Considerable variability in response to any one meal was observed within the group of subjects, but those subjects who produced high serum gastrin concentrations to one meal did so to the others. Conversely, a low response to one meal was reflected in low responses to the other two meals. Fasting serum gastrin concentration was correlated with the age of the subject. Repeatability of the response to one meal was tested in two subjects who ate the same meal on four separate occasions showing their responses to be repeatable. It is concluded that the total gastrin concentrations and total integrated responses following each of the three meals were very similar despite the differences in size and composition of the meals, possibly indicating the existence of normal effective feedback mechanism controlling gastrin response.

0072 PROSTAGLANDINS AND CANINE GASTRIC ACID SECRETION [Abstract]. (Eng.) Dozois, R. R.; Wollin, A.; Thompson, C. J. (Mayo Clinic and Mayo Foundation, Rochester, MN). *Mayo Clin. Proc.* 50(9):531-532; 1975.

0073 DIFFERENTIAL SENSITIVITY OF CANINE ANTRUM AND FUNDUS TO TOPICAL BILE SALTS [Abstract]. (Eng.) Ritchie, W. P., Jr. (Walter Reed Army Inst. Res., Washington, DC). *Surg. Forum* 24:374-376; 1973.

0074 ABSENCE OF NITROSO FORMATION FROM [^{14}C]-METHOMYL AND SODIUM NITRITE UNDER SIMULATED STOMACH CONDITIONS. (Eng.) Han, J. C. Y. (Biochemicals Dept., E. I. du Pont de Nemours & Co., Inc., Wilmington, DE 19898). *J. Agric. Food Chem.* 23(5): 892-896; 1975.

0075 STIMULATION AND INHIBITION OF ACID SECRETION FROM THE RAT ISOLATED GASTRIC MUCOSA. (Eng.) Hearn, R.; Main, I. H. M. (Sch. Pharmacy, Univ. London, 29/39 Brunswick Square, London WC1N 1AX, England). *J. Physiol.* 251(1):11P-12P; 1975.

0076 REFLEX INHIBITION OF PAROTID SALIVARY SECRETION FROM THE PORTAL VENOUS SYSTEM OF SHEEP. (Eng.) Carr, D. H. (Royal [Dick] Sch. Veterinary Studies, Univ. Edinburgh, Edinburgh EH9 1QH, Scotland). *J. Physiol.* 251(1):15P-16P; 1975.

0077 EFFECT OF GROWTH HORMONE RELEASE INHIBITORY HORMONE ON GASTRIC SECRETION IN THE CAT [Abstract]. (Eng.) Reed, J. D.; Albinus, M.; Gomez-Pan, A.; Hall, R.; Thompson, M. H.; Venables, C. W.; Besser, G. M.; Shally, A. V. (Depts. Physiology, Medicine and Surgery, Univ. Newcastle upon Tyne, Newcastle upon Tyne, England). *Br. J. Surg.* 62(8):664; 1975.

0078 NORMAL DISTRIBUTION AND POST-PRANDIAL RELEASE OF GUT HORMONES [Abstract]. (Eng.) Bloom, S. R.; Bryant, M. G.; Cochrane, J. P. S. (Hammersmith Hosp., London W12 OHS, England). *Clin. Sci. Mol. Med.* 49(3):3P; 1975.

0079 INHIBITION OF GASTRIC ACID SECRETION AND G-CELL RELEASE OF GASTRIN BY GROWTH-HORMONE RELEASE-INHIBITING HORMONE (GH-RIH) [Abstract]. (Eng.) Barros D'Sa, A. A. J.; Bloom, S. R.; Polak, J. M.; Baron, J. H. (Royal Postgraduate Medical Sch., London W12 OHS, England). *Clin. Sci. Mol. Med.* 49(3):26P; 1975.

0080 THE EFFECT OF CARBENOXOLONE AND PHENOL RED ON THE PERMEABILITY OF STEROID-TREATED GASTRIC MUCOSA, USING Tc AS A TRACER [Abstract]. (Eng.) Newman, B. M.; Elder, J. B.; Gillespie, I. E. (Royal Infirmary, Manchester, England). *Br. J. Surg.* 62(8): 659-660; 1975.

0081 SPASMOGENIC ACTIVITY OF SOME CHOLERETIC DRUGS ON THE RAT PYLORUS. (Eng.) Bertaccini, G.; Impicciatore, M.; Chiavarini, M.; Molina, E. (Dept. Pharmacology, Univ. Parma, Parma, Italy). *Pharmacol. Res. Commun.* 7(2):163-169; 1975.

0082 MUCINOUS SECRETION OF TOTALLY ISOLATED PORCINE STOMACH PERFUSED WITH HOMOLOGOUS BLOOD. (Eng.) Kowalewski, K.; Kolodej, A.; Secord, D. C. (Surgical-Medical Res. Inst., Univ. Alberta, Edmonton, Alberta, Canada). *Eur. Surg. Res.* 7(2): 109-119; 1975.

0083 EFFECT OF COMPOUND 561 ON GASTRIC SECRETION. (Eng.) Slovak, A.; Svatos, A. (No affiliation given). *Manuf. Chem. Aerosol News* 45 (6):25, 29; 1974.

0084 MULTICELLULAR BIOCHEMICAL ENSEMBLE PROVIDING FOR HYDROCHLORIC ACID SECRETION IN THE RAT STOMACH. (Rus.) Salganik, R. I.; Kiseleva, E. V.; Bersimbaev, R. I.; Khristoliubova, N. B. (Inst. Cytology Genetics, Novosibirsk, USSR). *Dokl. Akad. Nauk. SSSR* 224(5):1220-1222; 1975.

0085 THE EFFECT OF A COMBINED ANTICHOLINERGIC AGENT AND TRANQUILIZER ON GASTRIC SECRETION IN MAN. (Ger.) Scherberger, R.-R.; Kaess, H.; Bruckner, S. (Medical Clinic, Univ. Heidelberg, Heidelberg 1, Germany). *Arzneim. Forsch.* 25(9): 1460-1463; 1975.

See also, 0047, 0055, 0181, 0235, 0289, 0296, 0301.

SECRETION AND METABOLISM

Pancreas

0086 INFLUENCE OF A SYNTHETIC PROSTAGLANDIN ANALOG ON PANCREATIC SECRETION. (Eng.) Rosenberg, V.; Biezunski, D.; Gonda, M.; Dreiling, D. A.; Rudick, J.; Robert, A. (Mount Sinai Sch. Medicine, 5th Ave. and 100th St., New York, NY 10029). *Surgery* 79(5):509-514; 1976.

The effects of a synthetic prostaglandin analog, 16,16-dimethyl prostaglandin E_2, methyl ester (16-diMe-PGE$_2$), on pancreatic secretion were evaluated in seven mongrel dogs with chronic duodenal fistulas. Graded doses of 16-diMe-PGE$_2$ were administered i.v. (0.1, 0.3, 0.5, and 1.0 μg/kg), intraduodenally, or intragastrically (15, 30, 50, 100 μg/kg) with the pancreas in the resting state or in response to secretin and secretin with cholecystokinin-pancreozymin. Profound and prolonged inhibition of volume and bicarbonate concentration of secretion occurred in the resting and stimulated gland. ED_{50} was 0.31 μg/kg i.v. (1/75 the ED_{50} for PGE_1) and 25 μg/kg intraduodenally. As with PGE_1, stimulation of enzymes occurred, even with doses that were subthreshold for inhibition of volume and HCO_3. Like PGE_1, 16-diMe-PGE_2 had a dual action on the intact canine pancreas (stimulation of enzymes and inhibition of volume and electrolytes), but was much more potent, had a prolonged action, and was active intraduodenally and intragastrically. Nonsteroid inhibitors of endogenous prostaglandin synthesis did not alter these effects.

0087 STUDIES ON INTRACELLULAR TRANSPORT IN THE RAT EXOCRINE PANCREAS: I. INHIBITION BY AROMATIC AMINO ACIDS IN VITRO.

(Eng.) Bieger, W.; Kern, H. F. (Dept. Anatomy, Univ. Heidelberg, Im Neuenheimer Feld 307, D-6900 Heidelberg, Germany). *Virchows Arch.* [*Pathol. Anat.*] 367(4):289-305; 1975.

The ability of natural and modified aromatic amino acids (phenylalanine, tryptophan, *p*-chlorophenylalanine, and *p*-fluorophenylalanine) to induce paracrystal formation in the rough endoplasmic reticulum (RER) of isolated male Wistar rat pancreatic lobules and the affect on the secretory process in the exocrine cell were studied. *In vitro* incubation of rat pancreatic lobules in the presence of 10 mM of the four aromatic amino acids induced paracrystal formation in the cisternal space of the RER and in the acinar lumen. Aggregation of secretory material in transitional elements of the RER suggests tubular connection to the Golgi complex. Paracrystal formation was correlated with a disturbance of the three major phases in the secretory process of the exocrine cell. Incorporation of radioactive amino acids into proteins was inhibited by 10 mM phenylalanine and tryptophan by 20 and 50%, resp., and by *p*-chlorophenylalanine at 1 and 10 mM concentrations by 50 and 75%, resp. The inhibition of protein synthesis was not due to a reduced intracellular concentration of radioactive precursor amino acids. Intracellular transport of newly synthesized proteins as studied by a radioassay for zymogen discharge and by cell fractionation was similarly inhibited by 10 mM phenylalanine, tryptophan, or *p*-chlorophenylalanine (20, 30, and 40%, resp.). Discharge of zymogens as measured by the secretion of amylase stimulated with 5 x 10^{-6} M carbamylcholine was reduced by 20% if 10 mM phenylalanine, tryptophan or *p*-chlorophenylalanine were present in the medium. On sodium dodecylsulfate gel electrophoresis, paracrystalline proteins showed the same electrophoretic pattern as the content of zymogen granules. The results demonstrate that paracrystals are formed in the RER, the Golgi complex, and in the acinar lumen. It was concluded that the paracrystals in the RER of exocrine pancreatic cells are not precipitated from aromatic amino acids, but may arise from aggregation of normal secretory proteins.

0088 THE EFFECT OF PROTEASE INHIBITORS ON PANCREATIC AND SERUM TRYPSIN AND LIPASE ACTIVITIES IN RATS WITH ACUTE PANCREATITIS.

(Rus.) Khudolei, I. F.; Levitskii, A. P.; Synovets, A. S. (N. I. Pirogov Medical Inst., Odessa, USSR). *Vopr. Med. Khim.* 21(3):296-299; 1975.

0089 CHANGES IN EXOCRINE PANCREATIC SECRETION PRODUCED BY VARIOUS DRUGS: AN EXPERIMENTAL STUDY.

(Ger.) Daniel, P.; Unger, K. (Bezirkskrankenhaus, DDR-90 Karl-Mark-Stadt, Zeisigwaldstrasse 101, Germany). *Zentralbl. Chir.* 100(9): 554-559; 1975.

See also, 0024.

SECRETION AND METABOLISM

Hepatobiliary Tract

0090 CHARACTERISTICS OF HUMAN EMBRYONIC HEPATOCYTES CULTIVATED IN VITRO.

(Rus.) Eraizer, T. L.; Grinberg, K. N.; Vorsanova, S. G. (USSR Acad. Medical Sci., Moscow, USSR). *Bull. Exp. Biol. Med.* 79(15):123-125; 1975.

A simple and reproducible method of cultivating liver cells from 7 to 12-week-old human embryos in a monolayer was developed. The liver was washed with a medium of 80% glutamine, 20% embryonic calf serum, and, in the beginning stages of cultivation, 150 mg/ml of prednisolone. The surrounding connective tissue was removed and the liver was ground in a 1:1 mixture of trypsin and versene. After 30 min of incubation at 36.5 C, the liver was forced through a pipet into the medium, the mixture was centrifuged for 10 min at 2,000 rpm, and the precipitate was resuspended in an additional amount of medium. The cells (1-3 x 10^6) were placed in 4 ml of medium on a dish and cultivated at 36.5 C in an atmosphere with 7% CO_2. On the third day, 0.12 U/ml of insulin was added. The medium was changed every 3 days. The culture showed the capacity for limited growth, displayed a viability of 4-6 weeks without being subcultured, and retained some specific characteristics: synthesis of serum protein (albumin and α-fetoprotein), a significant amount of glycogen, a high activity of monoamine oxidase, and a characteristic response to a high concentration of glucocorticoids. The authors suggest that these properties may be useful as markers for genetic experiments.

0091 PURIFICATION AND CHARACTERIZATION OF A LIVER SPECIFIC ANTIGEN. (Eng.) Mihas, A. A.; Hirschowitz, B. I.; Saccomani, G. (Div. Gastroenterology, Univ. Alabama Birmingham, Birmingham, AL 35294). *J. Immunol.* 116(5):1228-1235; 1976.

A liver-specific antigen (F-antigen) previously demonstrated in saline extracts of BALB/c mouse liver by double immunodiffusion was isolated and characterized. The antigen had an immunoelectrophoretic mobility similar to that of serum β_2-globulins, was relatively thermolabile, and was precipitated at a 30-70% saturated ammonium sulfate concentration. Gel-filtration on Sephadex G-200 revealed liver-specific antigenicity in the second peak. Ion-exchange chromatography on DEAE-Sephadex A-50 revealed four peaks, of which only the third one exhibited liver-specific antigenicity. This active peak contained 11 polypeptides on sodiumdodecyl sulfate (SDS) polyacrylamide gel electrophoresis. After electrophoresis on acrylamide gel in the absence of SDS, antigenic activity was detected on one fast-moving band. Extraction of the protein band followed by SDS gel electrophoresis showed one major component of molecular weight 75,000 and two minor bands of molecular weight 72,000 and 93,000, resp. The results indicate that the antigen is a protein or is closely associated with a protein composed of three polypeptides.

0092 BILIARY LIPID COMPOSITION IN EARLY CHILDHOOD. (Eng.) Von Bergmann, J.; Von Bergmann, K.; Hadorn, B.; Paumgartner, G. (Dept. Clinical Pharmacology, Univ. Berne, Murtenstrasse 35, 3008 Berne, Switzerland). *Clin. Chim. Acta* 64(3):241-246; 1975.

The biliary lipid composition was studied in 11 children without hepatic or gastrointestinal disease aged 15-54 months. The molar percentages of cholesterol, bile acids, and phospholipids in the biliary lipid mixture averaged 5.0, 80, and 15%, resp. Cholic, chenodeoxycholic, deoxycholic, and ursodeoxycholic acid comprised 48, 45, 4, and 3% of total bile acids, resp. A comparison with data reported for the adult reveals that the molar percentage of cholesterol is relatively low in early childhood. It is suggested that this factor is responsible for the low incidence of cholesterol gallstones in this age group.

0093 THE ESTIMATION OF PHOSPHOLIPIDS IN BILE. (Eng.) Murison, J.; Festi, D.; Ross, P. E.; Bouchier, I. A. D. (Ninewells Hosp., Medical Sch., Dundee, DD1 9SY, U.K.). *Clin. Chim. Acta* 68(2):159-166; 1976.

Total and lipid phosphorus were measured in the duodenal aspirate of 24 fasting subjects following an i.v. injection of cholecystokinin (100 U) to determine whether the introduction of a lipid extraction step affects the bile acid/phospholipid/cholesterol ratio. The lipid phosphorus values were lower than the total phosphorus, a difference most pronounced in dilute samples. Storage at -20 C over 4 weeks resulted in a loss of over 50% lipid phosphorus. These alterations in the lipid phosphorus affected the calculation of biliary phospholipid and the saturation index of cholesterol in bile, causing it to be erroneously elevated. It is concluded that analysis of bile samples should be undertaken on freshly obtained samples and should include a preliminary step for the extraction of lipids.

0094 LIVER CELL PLASMA MEMBRANE LIPIDS AND THE ORIGIN OF BILIARY PHOSPHOLIPID. (Eng.) Yousef, I. M.; Bloxam, D. L.; Phillips, M. J.; Fisher, M. M. (Dept. Pathology, Univ. Toronto, Toronto, Ontario M5S 1A8, Canada). *Can. J. Biochem.* 53(9): 989-997; 1975.

The source and mechanism of biliary phospholipid secretion were studied in male Wistar rats to determine whether the bile canalicular membrane differs in terms of composition and phospholipid metabolism from the remainder of the plasma membrane not directly involved in bile secretion. The hepatocyte plasma membranes of fed rats were separated into a fraction rich in bile canaliculi by discontinuous sucrose density gradient ultracentrifugation and a plasma membrane fraction. Ultrastructurally, the bile canalicular fraction consisted almost exclusively of intact bile canaliculi with their contiguous membranes. The remaining plasma membrane fraction consisted primarily of vesicles and sheets of membranes free from bile canaliculi. The bile canalicular membrane fraction contained relatively more total lipid, cholesterol, and phospholipid, and less protein. The phospholipid composition of the two fractions was the same, but the specific activity of the bile canalicular membrane phospholipids, up to 12 hr following *in vivo* administration of [2-^{3}H]glycerol, was always significantly greater than that of the remaining plasma membranes, and showed a biphasic response not found in the latter. The specific activity of the phosphatidylcholine, phosphatidylethanolamine, and lysophosphatidylcholine of the bile canalicular membranes rose to a peak within 40 min after administration of the label, fell sharply, and then rose to a second peak after 120 min. The specific activity of the sphingomyelin and phosphatidylserine plus phosphatidylinositol of the bile canalicular membranes and of all the phospholipids of the remaining plasma membranes did not show the biphasic pattern but increased steadily to reach a maximum at 120 min. The specific activity of biliary phosphatidylcholine followed a pattern identical to that of the phosphatidylcholine, phosphatidylethanolamine, and lysophosphatidylcholine of the bile canalicular membrane fraction. The average rate of turnover of phospholipid in the bile canalicular membranes was considerably greater than that in the remaining plasma membrane and other cell membrane fractions. The results indicate that the phospholipid of the bile canalicular membranes exists in two or more pools, turning over at different rates, and they support the concept that biliary phospholipid is derived from the bile canalicular membrane. The results also suggest that bile canalicular phospholipid may be derived from two different sources in contrast to the remaining plasma membrane.

0095 BILIARY LECITHIN SECRETION. II. EFFECTS OF DIETARY CHOLINE AND BILIARY LECITHIN SYNTHESIS. (Eng.) Robins, S. J.; Armstrong, M. J. (Veterans Admin. Hosp., Boston, MA). *Gastroenterology* 70(3):397-402; 1976.

Studies were performed to determine if the dietary content of choline influences biliary lecithin synthesis and secretion in the rat. Male Sprague-Dawley rats were fed either a choline-deficient diet or diets supplemented with 0.5% choline or 5.0% choline and studied after 2-3 weeks. Synthesis was at least 50% greater (as determined by ^{32}P incorporation into bile lecithin) in animals supplemented with 5.0% choline than in deficient animals. Changes in dietary choline produced no change in bile salt pool size or secretion rate. However, with each increment in dietary choline, biliary lecithin as well as cholesterol secretion rates were significantly increased. The results demonstrate that although bile salt is required for biliary lecithin secretion, the magnitude of secretion is dependent upon the extent of biliary lecithin synthesis, which in turn may be regulated by the amount of dietary choline. The results further indicate that biliary cholesterol secretion is more closely linked to lecithin than to bile salt secretion. These findings suggest that lecithin secretion might be independently manipulated when bile salt is deficient to achieve enhanced biliary cholesterol transport.

0096 BIOSYNTHESIS OF CHOLIC ACID IN RAT LIVER: 24-HYDROXYLATION OF 3α,7α,12α-TRIHYDROXY-5β-CHOLESTANOIC ACID. (Eng.) Gustafsson, J. (Dept. Chemistry, Karolinska Institutet, Stockholm, Sweden). *J. Biol. Chem.* 250(20):8243-8247; 1975.

The properties of an efficient 24-hydroxylating system consisting of the microsomal fraction and the 100,000 x *g* supernatant fluid of male Sprague-Dawley rat liver homogenate fortified with ATP were described. Conversion of 3α,7α,12α-trihydroxy-5β-[7β-^{3}H]cholestanoic acid into 3α,7α,12α,24-tetrahydroxy-5β-cholestanoic acid in rat liver was catalyzed either by the mitochondrial fraction fortified with the 100,000 x *g* supernatant fluid or the microsomal fraction fortified with 100,000 x *g* supernatant fluid and ATP. The microsomal system was more active than the mitochondrial system. With the microsomal system the rate of reaction was considerably faster with free 3α,7α,12α-trihydroxy-5β-cholestanoic acid as substrate than with the corresponding coenzyme A ester. Addition of coenzyme A inhibited the activity. Addition of cofactors other than ATP (NADPH, NADH, NADP, NAD, FMN, FAD, or cyclic AMP) and coenzyme A did not markedly influence the reaction. The 100,000 x *g* supernatant fluid could be substituted with a protein fraction obtained by ammonium sulfate precipitation and Sephadex chromatography of the 100,000 x *g* supernatant fluid. The reaction was not catalyzed by a mixed function oxidase since there was no incorporation of ^{18}O into the product when the reaction was performed in an atmosphere containing $^{18}O_2$. There was almost complete inhibition when the reaction was performed in an atmosphere consisting of nitrogen, indicating that oxygen may be obligatory for the reaction. Carbon monoxide did not inhibit the reaction. One atom of deuterium was incorporated into the product when the reaction was performed in a medium containing deuterated water. In contrast to the microsomal system, the mitochondrial system was not stimulated by the addition of ATP and was not inhibited by coenzyme A. The coenzyme A ester of 3α,7α,12α-trihydroxy-5β-cholestanoic acid was 24-hydroxylated more efficiently than the free acid. It is concluded that microsomal 24-hydroxylation of 3α,7α,12α-trihydroxy-5β-cholestanoic acid involves the combined action of a desaturase and a hydratase. The reaction catalyzed by the hydratase appears to be stereospecific since the 24α epimer of 3α,7α,12α-trihydroxy-5β-cholestanoic acid was the predominant product.

0097 METABOLISM OF BILE ALCOHOLS IN THE PERFUSED RABBIT LIVER. (Eng.) Cohen, B. I.; Kuramoto, T.; Rothschild, M. A.; Mosbach, E. H. (Public Health Res. Inst. City New York, Inc., New York, NY 10016). *J. Biol. Chem.* 251(9):2709-2715; 1976.

The mechanism and sequence of side chain hydroxylation of cholesterol in bile acid synthesis was studied in isolated perfused male New Zealand rabbit liver and the importance of 26- and 25-hydroxylation in cholic acid biosynthesis was compared. [*G*-^{3}H]-cholic acid was formed when the liver was perfused with 5β-[*G*-^{3}H]cholestane-3α,7α-diol, 5β-[*G*-^{3}H]cholestane-3α,7α,12α-triol, and 5β-[*G*-^{3}H]cholestane 3α,7α,26-triol. No [*G*-^{3}H]chenodeoxycholic acid was detected in the bile. These findings indicate that potential precursors of chenodeoxycholic acid were hydroxylated at position 12α either subsequent to or before hydroxylation of the cholesterol side chain. In addition, no other intermediates (tetrahydroxy or pentahydroxy bile alcohols) were found in the bile when these compounds were perfused in the liver. Bile acid precursors were detected in bile when the rabbit liver was perfused with 5β-[24-^{14}C]cholestane-3α,7α,25-triol. The 5β-[24-^{14}C]cholestane-3α,7α,25-triol was hydroxylated in the liver at the 12α position to yield the corresponding 5β-cholestane-3α,7α,12α,25-tetrol. The tetrol was further metabolized to a series of pentols (5β-cholestane-3α,7α,12α,22,25-pentol, 5β-cholestane-3α,7α,12α,23,25-pentol, 5β-cholestane-3α,7α,12α,24,25-pentol, and 5β-cholestane-3α,7α,12α,25,26-pentol). The major bile acid obtained from the perfusion of the 5β-cholestane-3α,7α,12α,25-triol was cholic acid. These experiments indicate that 12α-hydroxylation can occur in the rabbit liver after hydroxylation of the cholesterol side chain at either C-25 (5β-cholestane-3α,7α,25-triol) or C-26 (5β-cholestane-3α,7α,-26-

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triol). Apparently, the rabbit can form cholic acid by the classical 26-hydroxylation pathway and by 25-hydroxylated intermediates.

0098 MECHANISM OF THE STIMULATORY EFFECT OF FRUCTOSE ON ETHANOL OXIDATION IN PERFUSED RAT LIVER. (Eng.) Scholz, R.; Nohl, H. (Institut fur Physiologische Chemie, Physikalische Biochemie und Zellbiologie der Ludwig-Maximilians-Universitat Munchen, Goethestrasse 33, D-8000 Munchen 2, W. Germany). *Eur. J. Biochem.* 63(2):449-458; 1976.

The quantitative relation between the stimulated rate of ethanol oxidation and the net energy utilization due to fructose metabolism was studied in livers from fasted Wistar rats perfused with Krebs-Henseleit-bicarbonate buffer in a nonrecirculating system. Two series of experiments were performed: (a) ethanol was infused with stepwise increasing concentrations (0.1-20 mM) in the presence of 4 mM fructose, and (b) fructose was infused with stepwise increasing concentrations (0.5-10 mM) in the presence of 2 mM ethanol. From measured metabolic rates, energy-rich phosphates consumed for fructose metabolism, which were provided from oxidative phosphorylation ($\Delta \sim P$), and reducing equivalents derived from stimulated ethanol utilization, which were disposed by mitochondrial oxidation ($\Delta 2H$), were calculated. Under the various conditions studied, a linear relationship between these parameters was observed. The ratio $\Delta \sim P/\Delta 2H$ was about 2.0. The authors suggest that fructose stimulates ethanol oxidation indirectly by increasing the energy consumption of the liver due to the production of glucose and/or urea from fructose. Consequently, the rate of oxidative phosphorylation is increased; therefore, the capacity of the respiratory chain for oxidizing reducing equivalents derived from ethanol is enhanced. These data support the hypothesis that the rate of ethanol oxidation depends upon the rate of hepatic energy consumption in a given metabolic state.

0099 ABSORPTION OF CHOLESTEROL BY THE GALLBLADDER. (Eng.) Neiderhiser, D. H.; Harmon, C. K.; Roth, H. P. (Veterans Administration Hosp., Cleveland, OH 44106). *J. Lipid Res.* 17(1): 117-124; 1976.

[4-^{14}C]cholesterol (1-300 nM) dissolved in 1 ml of guinea pig bile was instilled into the *in situ* guinea pig gallbladder to study the absorption of cholesterol by the gallbladder. The bile contained 7 μmol/ml bile acid, 27 nmol/ml lecithin, and 8 nmol/ml cholesterol. To this bile, the radioactive cholesterol, 0-1 μmol/ml egg lecithin, and 100 μg/ml BSP were added. After 1 nM [4-^{14}C]cholesterol was instilled in bile without added lecithin, 77 ± 8% of the radioactivity was demonstrated in the gallbladder wall within 6 hr. The proportion of cholesterol absorbed by the gallbladder decreased as the concentration of added lecithin or bile salts was increased. Absorption of cholesterol increased as the time of instillation increased. Radioautography showed radioactivity in the mucosa, and subcellular fractionation of homogenized cells by centrifugation showed cholesterol in the mitochondrial (23 ± 4%) and microsomal (18 ± 4%) fractions. Studies on specific activity suggested that there was net absorption of cholesterol and not merely an exchange of cholesterol in the contents for cholesterol in the wall. The results indicate that significant quantities of cholesterol, but not cholesterol ester, can be absorbed by the guinea pig gallbladder. The absorbed cholesterol can be converted to cholesterol ester. The evidence suggests that in man cholesterosis is not due to the absorption by the gallbladder wall of cholesterol ester from the gallbladder lumen, but may represent an abnormality of cholesterol ester transport out of the gallbladder with an accumulation in the submucosa.

0100 HEPATIC ORGANIC ANION UPTAKE IN THE RAT. (Eng.) Scharschmidt, B. F.; Waggoner, J. G.; Berk, P. D. (Natl. Inst. Health, Bethesda, MD 20014). *J. Clin. Invest.* 56(5):1280-1292; 1975.

The hepatic uptake of bilirubin (BR), indocyanine green (ICG), and BSP was studied in 350 anesthetized Sprague-Dawley rats by determining the initial plasma disappearance rate (V) of unlabeled ICG, or of tracer quantities of [^{3}H]BR or [^{35}S]BSP injected into the jugular vein simultaneously with unlabeled BR or BSP. Similar studies were also performed involving the simultaneous injection of potential inhibitors of hepatic uptake. Hepatic uptake determined by direct tissue measurement could be accurately estimated from the plasma disappearance data. Saturation of hepatic uptake with increasing dose was readily demonstrated for each of these three organic anions, and in each instance a plot of V versus dose took the form of a rectangular hyperbola analyzable in terms of Michaelis-Menten kinetics. The saturable uptake process for BR showed a V_{max} more than 100 times the normal net transfer rate from plasma to bile. Hepatic uptake of BR, BSP, and ICG showed relatively selective, mutually competitive inhibition; glycocholic acid did not inhibit hepatic uptake of any of these substances, and finally, "counter-transport" could be demonstrated for each of the three test substances. These data are compatible with the existence of a carrier-mediated transport process for hepatic uptake of each of these three organic anions and clarify the relationship of hepatic BR uptake to its overall transport from plasma to bile.

0101 BROMSULFOPHTHALEIN UPTAKE BY ISOLATED LIVER PARENCHYMAL CELLS. (Eng.) van Bezooijen, C. F. A.; Grell, T.; Knook, D. L. (Inst. Experimental Gerontology TNO, 151 Lange Kleiweg, Rijswijk, The Netherlands). *Biochem. Biophys. Res. Commun.* 69(2):354-361; 1976.

The liver function of removing foreign compounds from the serum was investigated by measuring the uptake of [^{35}S]BSP by isolated WAG/Rij rat hepatocytes. The cells in concentrations ranging between 0.05 and 0.4 x 10^6 cells/ml were incubated with 30 nmoles [^{35}S]BSP/ml for 15 min at 37 C. An uptake of 2.87 nmoles BSP/10^6 cells was measured. The saturation of the rate of BSP uptake with increasing amounts of BSP in the medium, the ability to take up free BSP against a concentration gradient, and the dependence of the uptake mechanism on temperature and metabolic energy suggest the presence of an active carrier system for the uptake of BSP by hepatocytes.

0102 UPTAKE OF BROMOSULFOPHTHALEIN BY ISOLATED LIVER CELLS.

(Eng.) Schwenk, M.; Burr, R.; Schwarz, L.; Pfaff, E. (Institut fur Toxikoligie, Universitat Tubingen, Tubingen, W. Germany). *Eur. J. Biochem.* 64(1):189-197; 1976.

Uptake of BSP into isolated hepatocytes of male Sprague-Dawley rats was studied with special regard to the kinetics of transport. The uptake of BSP (< 50 μM) followed Michaelis-Menten kinetics only at low substrate concentrations with an apparent K_m = 7 μM and V = 2.6 ± 1.7 nmole/mg protein/min. At higher BSP concentrations there was a second mechanism of uptake indicated by the deviation from linearity in the Lineweaver-Burk plot. The activation energy of uptake was 11 kcal/mole at 10 μM BSP. Uptake was independent of metabolic energy and of the Na^+ gradient across the membrane. Metabolic inhibitors such as Actinomycin A, rotenone, and carbonylcyanide *m*-chlorophenylhydrazone had no detectable effect on BSP uptake. Taurocholate did not inhibit uptake, while indocyanine green inhibited competitively at low BSP concentrations and activated uptake at high BSP concentrations (> 20 μM). Amino acid reagents, such as dinitrofluorobenzene, mersalyl, *N*-ethylmaleimide, and dithionitrobenzene did not affect uptake at a concentration of 100 μM. No pH optimum for BSP uptake was observed in the physiological pH range. Adsorption of BSP to the liver cell membrane had two distinguishable sites with affinities $K_1 = 5.7 \times 10^{-6}$ M and $K_2 = 7 \times 10^{-5}$ M and binding capacities n_1 = 1.2 nmole/mg protein and n_2 = 7 nmole/mg protein. Adsorption was inhibited by indocyanine green. The results are consistent with the hypothesis that BSP is bound in an energy-consuming process to a translocating site, possibly in the undissociated form or as ion pair. The consecutive transfer across the membrane appears to require little additional energy.

0103 DIFFERENCES OF REABSORPTION OF UNCONJUGATED BSP AND BSP-GLUTATHIONE FROM THE RAT BILIARY TREE AFTER RETROGRADE INTRABILIARY INJECTION.

(Eng.) Dammann, H. G.; Czok, G. (I. Medizinische Universitats-Klinik der Universitat Hamburg, 2000 Hamburg 20, Martinstrasse 52, W. Germany). *Res. Exp. Med.* 165(3):181-190; 1975.

The biliary excretion of unconjugated sulfobromophthalein sodium (BSP-U) and BSP-glutathione (BSP-GSH) was studied in male Wistar rats after retrograde intrabiliary injection. BSP-GSH was excreted to a much greater extent than BSP-U within the first 5 min after retrograde administration. BSP-GSH was reabsorbed to a lesser extent than BSP-U. After 5 min the reabsorption of BSP-U and BSP-G after retrograde injection seemed to be dependent on the concentration and the contact time in the biliary tree. It is suggested that the different biliary excretion of BSP-U and BSP-GSH after i.v. injection might be explained partly by a different mode of reabsorption.

0104 BILIARY EXCRETION OF DRUGS IN THE RAT DURING LIVER REGENERATION.

(Eng.) Uesugi, T.; Bognacki, J.; Levine, W. G. (Albert Einstein Coll. Medicine Yeshiva Univ., Bronx, NY 10461). *Biochem. Pharmacol.* 25(10):1187-1193; 1976.

Alterations in liver function during liver regeneration were studied in Wistar rats by measuring bile flow and the biliary excretion of bile salts, BSP, its glutathione conjugate (BSP-GSH), phenol-3,6-dibromophthalein disulfonate (DBSP), and tartrazine (TZ). Immediately after partial hepatectomy, bile flow and bile salt secretion, expressed per gram of liver, were significantly increased. Bile flow remained high through the third day. The concentration of bile salts on the first day was significantly lower than that of controls and remained low through the fourth day, suggesting an increased osmotic potency. Plasma clearance of BSP injected i.v. (10 mg) was proportional to residual liver mass. The excretion of BSP-GSH after injection of BSP was decreased in parallel to the decrease in BSP-GSH transferase activity during liver regeneration. In contrast, the excretion of unconjugated BSP and unknown conjugates was actually increased. Biliary excretion of injected BSP-GSH was significantly decreased up to the third day postoperatively. These results suggest that some of the decreased BSP-GSH excretion after injection of BSP is attributable to the decreased activity of BSP-GSH transferase and to competition by unconjugated BSP. After partial hepatectomy, the excretion of injected BSP-GSH and DBSP, expressed per gram of liver, was about twice that of controls and thereafter rapidly returned to control levels. In contrast to the other dyes, the excretion of TZ (injected i.v., 26.7 mg) decreased in proportion to liver mass following partial hepatectomy. On the second and third day, the marked sex differences seen in controls were not observed. The results imply that BSP-GSH and DBSP are transported into the bile by a similar mechanism while the mechanism for TZ transport is considerably different.

0105 DISULFIRAM AS A TOOL IN THE STUDIES ON THE METABOLISM OF ACETALDEHYDE IN RATS.

(Eng.) Tottmar, O.; Marchner, H. (Inst. Zoophysiology, Univ. Uppsala, Box 560, S-751 22 Uppsala, Sweden). *Acta Pharmacol. Toxicol.* 38(4):366-375; 1976.

The liver acetaldehyde dehydrogenases and the acetaldehyde level in the blood during ethanol metabolism were studied *in vivo* in female Sprague-Dawley rats 24 hr after the administration of disulfiram (25-600 mg/kg). Ethanol was given i.p. as a 7.8% solution in saline at a dose of 1.7 g/kg. Acetaldehyde dehydrogenase activity and acetaldehyde concentrations in the blood were assayed spectrophotometrically and fluorimetrically, resp. High doses of disulfiram (150-600 mg/kg) caused a threefold decrease in the activity of the mitochondrial low-K_m enzyme but had no significant effects on the activity of the high-K_m enzymes present in the mitochondrial, the microsomal, and the cytosolic fractions. The concentration of acetaldehyde was threefold higher in the hepatic venous blood and fivefold higher in the peripheral blood in rats given disulfiram compared to rats given ethanol only. Low doses of disulfiram (25-50 mg/kg) decreased the activity of the low-K_m enzyme by 26%, and caused a significant increase in the liver output of acetaldehyde. The rate of ethanol elimination decreased by 35% at a high dose of disulfiram, whereas the alcohol dehydrogenase activity was not influenced. The authors suggest that the mitochondrial low-K_m enzyme has a primary role in the regulation of the hepatic output of acetaldehyde during ethanol metabolism.

0106 EFFECT OF GRADED BILIRUBIN LOADS ON BILIRUBIN TRANSPORT BY PERFUSED RAT LIVER. (Eng.) Bloomer, J. R.; Zaccaria, J. (Yale Univ. Sch. Medicine, New Haven, CT 06510). *Am. J. Physiol.* 230(3):736-742; 1976.

Features of hepatic bilirubin transport were studied in isolated perfused livers from male Wistar rats. When bilirubin was constantly infused (1.6-18.0 mg/hr) into the perfusion medium, which contained sheep RBC and 3.0 g/100 ml bovine serum albumin, the maximal excretion rate for bilirubin was 14.4 μg/min/g liver. Over a wide range of constant bilirubin infusion rates (maximum 25.9 μg/min/g liver) there was no effect on bile flow, bile acid excretion, or the pattern of bilirubin conjugates in bile. The hepatic extraction efficiency for unconjugated bilirubin from the perfusate also remained constant, averaging 26%. However, when bolus injections of bilirubin were used to produce higher levels of unconjugated bilirubin in the perfusate than could be attained during constant infusion, the disappearance rate of [^{14}C]bilirubin from the perfusate decreased with increasing bilirubin concentrations. The results indicate that the hepatic removal of unconjugated bilirubin and other organic anions is a saturable process.

0107 EFFECT OF PRIMARY BILE ACIDS ON BILE LIPID SECRETION FROM PERFUSED DOG LIVER. (Eng.) Hoffman, N. E.; Donald, D. E.; Hofmann, A. F. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *Am. J. Physiol.* 229(3):714-720; 1975.

An isolated canine liver perfusion technique featuring a second dog as the pump oxygenator was used to compare biliary lipid secretion during randomized, steady-state perfusions at two different rates of cholyl taurine or chenodeoxycholyl taurine infusions. The hepatic extraction of the trihydroxy-conjugated bile acid was considerably greater than that of the dihydroxy conjugate, possibly explained by ultrafiltration experiments that indicated that cholyl taurine was less protein bound than chenodeoxycholyl taurine. Both bile acids induced phospholipid and cholesterol secretion that was linearly proportional to bile acid secretion. However, each mole of secreted chenodeoxycholyl taurine induced a greater relative secretion of phospholipid and cholesterol than did that of cholyl taurine. Thus, the two primary bile acids in the canine liver are extracted at different rates and induce biliary secretion of different relative lipid composition.

0108 EFFECT OF CHRONIC ADMINISTRATION OF CARBON TETRACHLORIDE ON COPPER, ZINC, AND MERCURY BINDING IN BILE IN RATS. (Eng.) Tichy, M.; Cikrt, M. (Inst. Hygiene and Epidemiology, Prague, Czechoslovakia). *Toxicol. Appl. Pharmacol.* 36(1):163-172; 1976.

Changes in the concentrations of endogenous copper and zinc in rat bile after CCl_4 intoxication and changes in copper and zinc binding with components of the bile were examined. CCl_4 (1 ml/kg) was given s.c. to female Wistar rats twice a week during 3 mo. After 3 mo the bile ducts were cannulated in rats of one group; whereas, the animals in another group were sacrificed, and their livers removed. Solutions of $^{64}CuCl_2$, $^{65}ZnCl_2$, or $^{203}HgCl_2$ were administered i.v. to the rats with cannulated bile ducts. CCl_4 treatment provoked changes in copper and zinc concentrations in the bile and in the liver proteins. Treatment with copper or zinc salts resulted in changes in bile components of high molecular weight. The quantity of copper bound in different bile components was not changed after CCl_4 treatment; whereas, that of zinc did change. The findings indicate that mercury is bound in bile in a different way than copper or zinc. The changes in the binding of copper and zinc with bile components in rats given CCl_4 are reflected in changes of cumulative excretion of copper and zinc *via* bile during the 24 hr following their administration.

0109 EFFECT OF METHEMOGLOBINEMIA ON CARBON TETRACHLORIDE HEPATOTOXICITY. (Eng.) Pankow, D.; Ponsold, W. (Inst. Hygiene, Martin Luther Univ., West Germany). *Toxicol. Appl. Pharmacol.* 36(1):143-150; 1976.

The effect of methemoglobinemia on CCl_4-induced hepatotoxicity in normal and adrenalectomized outbred male albino rats is studied. Four experimental groups were examined: (I) controls; (II) those injected i.p. with methemoglobin-forming compound (0.08 mmol $NaNO_2$/kg or 1 mmol hydroxylamine hydrochloride/kg as aqueous solutions; 0.8 mmol nitrobenzene/kg, 0.15 mmol *m*-dinitrobenzene/kg, 3 mmol aniline/kg, or 0.6 mmol phenylhydrazine/kg in polyethylene glycol; (III) 5.2 mmol CCl_4/kg administered by stomach tube; and (IV) 5.2 mmol CCl_4/kg and methemoglobin-forming compound 4 hr later. Methemoglobin content and the activity of glutamic-pyruvic transaminase (GPT) and leucine aminopeptidase (LAP) were assayed. LAP and GPT assayed 24 hr after CCl_4 poisoning, showed no significant increase. However, the combination of CCl_4 plus $NaNO_2$ (group IV) produced significantly higher enzyme activities (GPT, 190 ± 84 U/l; LAP, 1110 U/l) than when CCl_4 was administered alone (group III--GPT, 123 ± 65 U/l; LAP, 644 U/l). LAP assay 48 hr after CCl_4 or CCl_4 plus $NaNO_2$ administration rose from 1356-2211 U/l. In adrenalectomized rats, $NaNO_2$ did not affect the hepatotoxic response of CCl_4. When normal rats received CCl_4 and $NaNO_2$, a depression of methemoglobin formation was apparent. CCl_4 plus aniline, nitrobenzene, *m*-dinitrobenzene, phenylhydrazine, or hydroxylamine hydrochloride produced potentiating differences, however these were not always significant. CCl_4 plus methemoglobin forming compounds produced a decrease in methemoglobin percentage in all cases over methemoglobin-forming compounds alone. The results demonstrate that $NaNO_2$-induced methemoglobinemia may produce potentiation of the toxic CCl_4 response.

0110 PLASMA LIPOPROTEINS IN RATS WITH EXPERIMENTAL BILIARY OBSTRUCTION. I. A CHEMICAL STUDY. (Eng.) Calandra, S.; Montaguti, M.; Cartoni, V.; Pasquali-Ronchetti, I. (Istituto di Patologia Generale, Universita delgi Studi di Modena, Modena, Italy). *Biochim. Biophys. Acta* 409(1):1-12; 1975.

The chemical and ultrastructural changes of male Wistar rat plasma lipoproteins in acute biliary obstruction were characterized. The lipoproteins were separated on cellulose acetate strips and by agar gel electrophoresis. Delipidated lipoproteins were analyzed by polyacrylamide gel electrophoresis. The level of very low density lipoprotein (VLDL) in plasma was found to increase from two- to threefold. VLDL was determined to have a high content of phospholipids and cholesterol and a diminution of the relative content of triacylglycerols and protein. On cellulose acetate electrophoresis, VLDL showed a β-mobility. The plasma concentration of low density lipoproteins (1.019-1.063 g/ml, LDL_2) increased several-fold above control level. Phospholipids and unesterified cholesterol were the major components of this fraction, which contained only a minute amount of cholesteryl ester (4%) and triacylglycerols (10%). LDL_2 were observed to contain a component that migrated to the cathodes in 1% agar gel electrophoresis. Separation of LDL_2 by gel filtration on 2% agarose column resulted in the identification of three subfractions. Subfraction I contained a large proportion of cholesterol and triacylglycerols. Subfraction II was rich in unesterified cholesterol and phospholipids, whereas subfraction III had a chemical composition fairly similar to that of the control LDL_2. The level of high density lipoproteins (HDL) also increased after bile duct ligation. The chemical composition of HDL_2 (1.063-1.125 g/ml) was characterized by a high content of unesterified cholesterol and phospholipids and by a remarkable reduction in the content of cholesteryl esters and protein. The authors suggest that the abnormalities of plasma lipoproteins found in cholestatic rats strongly resemble those found in biliary obstruction in man.

0111 CONJUGATION OF NON-ERYTHROID BILIRUBIN IN CHRONIC EXPERIMENTAL CHOLESTASIS IN THE DOG. (Eng.) Bergan, A.; Ostrem, T.; Gjelstad, N. (Rikshospitalet, Univ. Clinic, Oslo 1, Norway). *Scand. J. Gastroenterol.* 10(6):565-569; 1975.

The conjugation of nonerythroid bilirubin (NEB), i.e., the 10-20% of bilirubin synthesized mainly in the liver from tissue hemes, was studied in four dogs subjected to extrahepatic cholestasis of 7-14 days duration. δ-Aminolevulinic acid-5-^{14}C-HCl was injected i.v. as a NEB precursor. The appearances of unconjugated and conjugated labeled NEB as well as of the different azopigments were followed in systemic blood, liver vein blood, and thoracic duct lymph. The first NEB to appear was unconjugated; maximal concentration of unconjugated NEB in peripheral and liver vein blood was reached within 1 hr. The amount of conjugated NEB in both vascular compartments increased for 2-3 hr, after which time the degree of conjugation stabilized. The degree of conjugation was higher in liver vein than in peripheral blood for the first 2 hr. The a_0 azopigment (azobilirubin) was present in higher amounts in peripheral than in liver vein blood. All the other azopigments were present in higher amounts in liver vein blood. The results suggest that the extrahepatic NEB is brought into the liver in unconjugated form to be conjugated and returned to the blood, and that liver-produced NEB is delivered to the blood as conjugates.

0112 CYCLIC AMP IN SECRETIN CHOLERESIS: EVIDENCE FOR A REGULATORY ROLE IN MAN AND BABOONS BUT NOT IN DOGS. (Eng.) Levine, R. A.; Hall, R. C. (Upstate Medical Center, 750 East Adams St., Syracuse, NY 13210). *Gastroenterology* 70(4):537-544; 1976.

Cyclic AMP output in the bile in response to i.v. secretin was measured in 11 cholecystectomized patients, 12 baboons, and 15 dogs to determine the effect of secretin on cyclic AMP in perfusate. In addition, cyclic AMP concentration in human bile after dibutyryl cyclic AMP (DBcAMP), aminophylline, glucagon, and sodium dehydrocholate administration is documented. Secretin was given to patients with bile drainage tubes as an i.v. bolus (1 U/kg). In baboons and dogs, both secretin infusion (4 U/kg/hr) and bolus injection (1 U/kg) were used. In baboons, cyclic AMP was also determined in liver, extrahepatic duct tissue, and in perfusate from isolated segments of extrahepatic bile ducts. Secretin induced a marked choleresis in all three species. In humans, biliary cyclic AMP concentration increased an average of 68% ± 12% and in baboons fourfold, but no increase occurred in dogs. In baboons, cyclic AMP concentration increased in both bile duct tissue and perfusate from isolated bile ducts concomitant with secretin choleresis, but not in the liver. In humans the choleretic effects of sodium dehydrocholate (500 mg), aminophylline (500 mg), and glucagon (1.0 mg) were compared to dibutyryl cyclic AMP (0.25-0.3 mg/kg/min for 30-min period). All agents increased bile flow two- to threefold. Cyclic AMP concentration in bile markedly increased after glucagon and DBcAMP but not after sodium dehydrocholate and aminophylline. It is concluded that cyclic AMP is implicated in secretin choleresis in both humans and baboons, but not in dogs. The bile duct appears to be the site of cyclic AMP elaboration induced by secretin in baboons and probably is also in man.

0113 HEPATIC ARTERIAL AND PORTAL VENOUS FLOWS DURING HEMORRHAGE. (Eng.) Darle, N.; Lim, R. C., Jr. (Dept. Surgery I, Univ. Goteborg,

Goteborg, Sweden). *Eur. Surg. Res.* 7(4/5):259-268; 1975.

Changes of total liver blood flow (TLBF), portal venous, and hepatic arterial flows in the normotensive condition were investigated using a hemorrhagic model in four dogs. The dogs were bled stepwise from normal blood pressure to a pressure of 50-60 mm Hg by withdrawing 53-70% of the calculated blood volume. TLBF was measured by the xenon clearance method. Hepatic arterial blood flow was measured by electromagnetic flowmeter. Portal venous flow was calculated by subtracting hepatic arterial blood flow from TLBF. Systemic arterial blood pressure and portal venous pressure were also determined. Under normotensive conditions TLBF in mean was registered as 127 ml/min x 100 g liver tissue (25 ml/min x kg body weight). The relation between the flow value in portal vein and hepatic artery was an average of 2:3:1. There was a pronounced decrease of TLBF flow during hemorrhage. Portal venous flow decreased almost parallel to TLBF, while hepatic arterial flow decreased to a lesser extent, indicating an autoregulation in this flow bed. Hepatic arterial flow successively constituted a larger part of TLBF during hemorrhage, sometimes 65% compared to the normal value of about 30%. There was an increase of vascular resistance in the portal venous system and decreased resistance in the hepatic arterial bed. The authors suggest that if the observed circulatory events are also valid in humans, acute clamping of the hepatic artery during hemorrhagic shock could mean reduction of the already reduced TLBF by a further 65%.

0114 RELATIONSHIP OF SPLANCHNIC BLOOD FLOW AND PORTAL VENOUS RESISTANCE TO ELEVATED PORTAL PRESSURE IN THE DOG. (Eng.) Witte, C. L.; Tobin, G. R.; Clark, D. S.; Witte, M. H. (Univ. Arizona Coll. Medicine, Tucson, AZ). *Gut* 17(2):122-126; 1976.

In situ perfusion of the splanchnic circuit was carried out in 12 freshly killed dogs at varying perfusion rates and degrees of acute and chronic portal vein constriction to determine the relation of splanchnic blood flow and portal venous resistance to elevated portal pressure. In six normal dogs, portal pressure averaged 8.8 mm Hg and portal flow 658 ml/min. In the absence of portal vein constriction, increasing splanchnic perfusion to 1,800 ml/min, minimally raised portal pressure (12.8 mm Hg). With progressive acute constriction of the portal vein, however, comparable perfusion rates led to progressively higher portal pressure levels and with over 90% constriction, portal pressure was over 30 mm Hg with minimal elevation in splanchnic flow rate. In six other dogs alive 9 weeks after placement of an ameroid constrictor on the portal vein, portal pressure averaged 13.6 mm Hg or slightly higher than in normal dogs. Mesenteric venography and necropsy findings uniformly demonstrated 90% occlusion of the portal vein with extensive portasystemic collateralization. With increased perfusion of the splanchnic bed, portal pressure rose rapidly to about 35 mm Hg with a flow rate of 1,800 ml/min. These data suggest that in disorders where resistance to transhepatic portal flow is marked, a small increment in splanchnic blood flow, which normally exerts little or no influence on portal pressure, promotes profound portal hypertension and may account for spontaneous rupture of esophageal varices. Where resistance to transhepatic portal flow is mild but splanchnic blood flow is markedly hyperdynamic, reducing inflow may be sufficient to ameliorate extreme portal hypertension and its sequelae.

0115 THE EFFECTS OF PORTACAVAL SHUNTING AND PORTACAVAL TRANSPOSITION ON SERUM IgG LEVELS IN THE RAT. (Eng.) Benjamin, I. S.; Ryan, C. J.; Biol, L. I.; McLay, L. C.; Horne, C. H. W.; Blumgart, L. H. (Glasgow Royal Infirmary, Glasgow, Scotland). *Gastroenterology* 70(5):661-664; 1976.

Changes in the serum levels of immunoglobulin G (IgG, γ_2-globulin) and the liver-derived serum proteins, albumin, and slow α_1-globulin, were studied in male Sprague-Dawley rats over a 5-week period after portacaval shunt, portacaval transposition, or sham operation. In rats subjected to end-to-side portacaval shunt and to portacaval transposition, serum IgG levels rose progressively by approximately 100% over the 5-week period. During the same period, sham-operated control animals showed only the increase expected with age. Rats with a portacaval shunt showed a greater fall in body weight and liver weight than did those with a portacaval transposition, and also showed a greater fall in levels of liver-synthesized proteins. Albumin fell 20% for the animals with portacaval transposition and 30% for those with portacaval shunt. Slow α_1-globulin rose postoperatively in all three groups, but declined progressively from the elevated level after the first week in animals with portacaval shunt. Serum enzyme levels (SGOT, SGPT, alkaline phosphatase, lactate dehydrogenase, and creatine kinase) were markedly elevated during the first 48 hr after portacaval shunting, whereas after portacaval transposition the elevation was very small. Over the following 5 weeks, enzyme elevations continued to be marginally greater in the portacavally shunted animals. The results support the hypothesis that hypergammaglobulinemia is due to the shunting of antigen-rich portal blood past the reticuloendothelial cells of the liver, and that hepatocellular damage does not play a major role in this process. The authors suggest that the etiology of hypergammaglobulinemia in chronic liver disease in man may be similar.

0116 THE EFFECT OF PROLONGED ADMINISTRATION OF ALLYLISOPROPYLACETYLUREA TO RATS ON CYTOCHROME P-450 AND OTHER LIVER HAEMOPROTEINS. (Eng.) Rentsch, G.; Johnston, A. (Medical Biological Res. Div., Sandoz Ltd., Basel, Switzerland). *Xenobiotica* 6(3):151-157; 1976.

The effects during long-term administration of, and recovery from, allylisopropylacetylurea (400 mg/kg/day in two equal s.c. injections for 21 days) on the hepatic drug metabolizing system of male Sandoz OFA-SPF rats were investigated. In the liver, cytochromes P-450 and b_5, catalase, and 5-aminolevulinic acid synthetase were measured. Serum glutamate-pyruvate transaminase, glutamate-oxalacetate transaminase, and alkaline phosphatase were determined to assess cell damage, while urinary coproporphyrin and uroporphyrin were measured to assess the degree of porphyria. Serum glutamate-pyruvate and -oxalate transaminases and alkaline phosphatase were within normal range, except for a significant increase when compared to controls during days 10 and 18. In the liver, the lowering of cytochrome P-450 and catalase paralleled an increase in 5-aminolevulinate synthetase. Cytochrome b_5 was only marginally affected. The rats recovered well from long-term treatment with high doses of allylisopropylacetylurea and reverted to normal values for parameters measured after discontinuation of the drug, indicating that this compound does not inflict permanent damage in the rat. A mechanism for the intracellular action of allylisopropylacetylurea on cytochrome P-450 and other heme-containing compounds is presented.

0117 SPECIES DIFFERENCES IN CARBON TETRACHLORIDE-INDUCED HEPATOTOXICITY: THE ROLE OF CCl_4 ACTIVATION AND OF LIPID PEROXIDATION. (Eng.) Diaz Gomez, M. I.; de Castro, C. R.; D'Acosta, N.; de Fenes, O. M.; de Ferreyra, E. C.; Castro, J. A. (Laboratorio de Quimica Bio-Toxicologica, CITEFA, Zufriategui y Varela, Villa Martelli, Pcia de Buenos Aires, Argentina). *Toxicol. Appl. Pharmacol.* 34(1):102-114; 1975.

Experiments were carried out to establish a possible correlation between the extent of carbon tetrachloride activation to bound CCl_4 in the livers of different animal species and the liver microsomal content of both cytochrome P-450 (P-450) and cytochrome P-450 reductase activity. CCl_4-induced liver necrosis was more intense in the mouse (A/J strain) than in the guinea pig or the Syrian Golden hamster, which were more susceptible than the rat (Sprague-Dawley). The chicken was resistant to CCl_4. Liver microsomal P-450 reductase activity decreased in the following sequence: hamster > guinea pig > mouse > rat > chicken. The extent of the irreversible binding of ^{14}C from $^{14}CCl_4$ to cellular components decreased as follows: mouse = hamster > guinea pig > rat > chicken, while the intensity of the CCl_4-induced lipid peroxidation decreased in the order: rat > hamster = guinea pig > chicken = mouse. The results suggest a better parallelism between intensity of irreversible binding to cellular components and necrosis than between lipid peroxidation and necrosis. The necrotic process in the mouse was observed in absence of lipid peroxidation during the entire 24-hr period of intoxication. It was not possible to absolutely correlate the extent of the irreversible binding to microsomal lipids in the different species with either the characteristics of the spectral changes produced by CCl_4 by interaction with P-450 or with the content of P-450 or that of the P-450 reductase activity.

0118 QUANTITATIVE ANALYSIS OF METABOLISM OF HEPATIC TRIGLYCERIDE IN ETHANOL-TREATED RATS. (Eng.) Abrams, M. A.; Cooper, C. (Dept. Biochemistry, Case Western Reserve Univ., Cleveland, OH 44106). *Biochem. J.* 156(1):33-46; 1976.

The extent to which ethanol influences delivery of unesterified fatty acid of serum to liver was studied in male Sprague-Dawley rats. After an i.p. injection of ethanol (0.7 or 2.1 g/kg) caused the reversible, dose-dependent accumulation of hepatic triglyceride, ethanol (2.1 g/kg) was observed to have no effect on the flux of unesterified fatty acid of serum (4.3 μmol/min/100 g body weight). However, either dose increased the fraction of the total flux going to the liver from 0.16 to 0.27 as rapidly as could be measured (30 sec), and it remained elevated until all ethanol was cleared from the blood. The fraction of the total radioactivity in lipids of liver that was in triglyceride increased linearly for 1 hr from 30 to 50%, and there was a simultaneous decrease in phospholipid from 60 to 40%. The rate of synthesis of hepatic triglyceride derived directly from unesterified fatty acid of serum was calculated by using the flux rate of unesterified fatty acid in serum, the fractional hepatic uptake of this flux, and the percentage of liver fatty acid esterified to triglyceride. This contribution was related to the total synthetic rate of hepatic triglyceride (rate of accumulation + rate of release) to determine quantitatively how much of the developing fatty liver is attributable to increased uptake of unesterified fatty acid of serum. At the higher dose of ethanol, about half of the accumulating triglyceride is derived from this source, whereas with the lower dose of ethanol, it can account for all of the build-up.

0119 MECHANISM OF INCREASED HEPATIC UPTAKE OF UNESTERIFIED FATTY ACID FROM SERUM OF ETHANOL-TREATED RATS. (Eng.) Abrams, M. A.; Cooper, C. (Dept. Biochemistry, Case Western Reserve Univ., Cleveland, OH 44106). *Biochem. J.* 156(1):47-54; 1976.

The mechanism by which livers of ethanol-treated rats take up an increased fraction of the total flux of unesterified fatty acid in serum was studied to determine whether an acute dose of ethanol (i.p., 0.7 or 2.1 g/kg) can effect hepatic blood flow. Ethanol (0.7 g/kg) caused a twofold rise in the serum content of liver, and this serum was in rapid equilibrium with the general circulation. The fractional hepatic uptake from serum of a group of compounds with varying uptake mechanisms and metabolic fates was studied in control and ethanol-treated animals. All compounds tested, including unesterified fatty acid, showed an enhanced uptake when ethanol was given. For carbon tetrachloride (0.5-7.5 μl/100 g), a dose-response relationship was established between the amount administered, the amount taken up by liver, and the amount metabolized. This dose of ethanol caused the liver to receive an increased flow of blood, and as a result all compounds present and capable of being taken up by liver were taken up at an increased rate. Hepatic blood flow was measured by a technique that monitors the rate of clearance of a colloidal lipid emulsion. Ethanol increased hepatic blood flow by about 60%. This

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effect of ethanol on hepatic blood flow provides an explanation for the fatty liver and the synergistic effect between an acute dose of ethanol and carbon tetrachloride.

0120 EFFECTS OF A SINGLE INTOXICATING DOSE OF ETHANOL ON THE VITAMIN PROFILE OF ORGANELLES IN RAT LIVER AND BRAIN. (Eng.) Frank, O.; Luisada-Opper, A.; Sorrell, M. F.; Zetterman, R.; Baker, H. (New Jersey Medical Sch., 88 Ross St., East Orange, NJ 07018). *J. Nutr.* 106(5):606-614; 1976.

The effects of a single, p.o., intoxicating dose of ethanol (EtOH, 9 g/kg) on the distribution of water- and fat-soluble vitamins in various subcellular fractions of eight livers and eight brains from 16 male Sprague-Dawley rats were surveyed. Both organs showed redistribution of vitamins among the various organelles after EtOH was given in comparison to eight controls. In saline-treated animals the nucleus and cytosol of the liver contained the highest proportion of all vitamins, and the microsomes and lysosomes contained the least. As compared to controls, EtOH ingestion generally caused the mitochondria and microsomes to accumulate vitamins, while vitamins in the lysosomes were decreased. Except for thiamin and niacin, the whole brain vitamins were higher than those in controls; they were primarily concentrated in the brain nucleus and mitochondria. It is concluded that changes in the organelle vitamin content of the liver are the result of EtOH injury. The simultaneous attempt to repair the injury is manifested by the sequestration of vitamins in the organelles of EtOH-treated animals as compared to controls.

0121 PATHWAYS RESPONSIBLE FOR THE ADAPTIVE INCREASE IN ETHANOL UTILIZATION FOLLOWING CHRONIC TREATMENT WITH ETHANOL: INHIBITOR STUDIES WITH THE HEMOGLOBIN-FREE PERFUSED RAT LIVER. (Eng.) Thurman, R. G.; McKenna, W. R.; McCaffrey, T. B. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA 19174). *Mol. Pharmacol.* 12(1):156-166; 1976.

The perfused rat liver was used to study the metabolism of the adaptive increase in ethanol metabolism resulting from chronic treatment with ethanol. Female Sprague-Dawley rats received ethanol in a semiliquid diet or in a sucrose solution for 5-7 weeks. Ethanol metabolism was activated 60% over controls as a result of chronic ethanol treatment. Rates in both groups were nearly completely abolished (less than 16 μmoles/g/hr) by 4-methylpyrazole. Similar inhibition was observed with inhibitors of the mitochondrial respiratory chain (rotenone and antimycin A) and atractyloside. The adaptive increase was completely abolished with ouabain, an inhibitor of the sodium-plus potassium-activated ATPase. Basal respiratory rates (127 μmoles/g/hr) were markedly elevated (205 μmoles/g/hr) as a result of treatment with ethanol. However, succinate-dependent respiration of isolated mitochondria was either unaffected or slightly depressed in livers from ethanol-treated animals. There was a direct relationship between oxygen uptake and ethanol oxidation in the perfused liver. These data are consistent with the hypothesis that the primary event in enhanced ethanol metabolism following chronic treatment with ethanol is an increase in ATPase activity, most likely due to the sodium pump. The ADP produced from enhanced ion movement enters the mitochondrial space and stimulates electron transport and oxygen uptake. As a consequence of these events, a greater rate of NADH reoxidation occurs, resulting in a greater rate of production of NAD^+, which stimulates ethanol oxidation via alcohol dehydrogenase.

0122 SYNERGISTIC ACTION OF GLUCAGON AND INSULIN IN REGULATION OF HEPATIC REGENERATION. (Eng.) Bucher, N. L. R.; Swaffield, M. N. *In: Advances in Enzyme Regulation. Proceedings of the Thirteenth Symposium on Regulation of Enzyme Activity and Synthesis in Normal and Neoplastic Tissues held at Indiana University School of Medicine, Indianapolis, Indiana, October 7 and 8, 1974.* Pergamon Press. (Oxford, England): vol. 13, pp. 281-293; 1975.

Male Sprague-Dawley rats eviscerated of portal splanchnic organs and deprived of a portal blood supply were maintained by continuous i.v. infusion to study the roles of pancreatic hormones in hepatic regeneration. [^{3}H]thymidine (50 μCi, i.v.) was injected 1 hr before the termination of the experiment to assay regenerative activity. A regenerative response to partial hepatectomy was observed when the rats were given only electrolytes and glucose, as evidenced by a significant rise in the rate of hepatic DNA synthesis. The response was delayed by about 24 hr and diminished by about two-thirds in comparison to normal controls. Addition of insulin (0-8.0 U/kg/24 hr with glucose) or glucagon (0-3.0 U/kg/24 hr with FreAmine) had little effect when given separately. In combination, however, the hormones were capable of fully restoring the DNA biosynthetic rate to normal, even when the start of the hormone treatment was delayed for 6-7 hr after the partial hepatectomy. The modest but significant regenerative activity inducible in the near total absence of pancreatic hormones and the nondeleterious effect of delaying insulin and glucagon treatment suggest that additional hormonal or humoral agents may be involved in the initial activation of hepatic regeneration. The precipitous fall in portal vein insulin levels to near zero observed during the first several hours of regeneration in normal (noneviscerated) rats further supports this view, as does the preliminary finding that infusion of insulin and glucagon into eviscerated but nonhepatectomized control rats failed even minimally to excite DNA synthesis in intact livers. Thus, the pancreatic hormones, acting in synergy, appear to be the major regulators of the rate and possibly also of the magnitude of the proliferative process.

0123 EFFECTS OF CHOLERA ENTEROTOXIN, GLUCAGON, AND DIBUTYRYL CYCLIC AMP ON RAT LIVER ALKALINE PHOSPHATASE, BILE FLOW, AND BILE COMPOSITION. (Eng.) Baker, A. L.; Kaplan, M. M. (Univ. Chicago Hosp., 950 E. 59th St., Chicago, IL 60637). *Gastroenterology* 70(4):577-581; 1976.

Experiments were carried out to examine (a) whether or not cholera enterotoxin produces changes in bile flow or bile composition similar to the changes in fluid and electrolyte secretion produced in the intestine, (b) whether changes in bile flow or bile composition might provide some insight into the function of rat liver alkaline phosphatase, and (c) the hypothesis that the function of hepatic alkaline phosphatase is to mediate the secretion of choline into bile. Cholera enterotoxin (45 μg/250 g, i.v.), caused a sixfold rise in the activity of liver alkaline phosphatase in male CD rats within 12 hr. There was no change in bile volume or in the concentration or total bile content of Na^+, K^+, HCO_3^-, or Cl^- for 36 hr after the administration of cholera toxin. However, bile phospholipid output fell markedly from a control level of 15.0 ± 1.0 μmol/6 hr to a low level of 4.0 ± 1.2 μmol/6 hr in the 12- to 18-hr collection ($p<0.001$). There was a similar fall in bile acid secretion, from a control value of 9.8 ± 0.4 μmol/6 hr to 4.1 ± 0.9 μmol in the 12- to 18-hr period ($p<0.01$). The cholera effect was prolonged. Bile acid and phospholipid secretion rates did not return to control values until 30-36 hr after the administration of cholera enterotoxin. The cholera toxin-induced reductions in bile acid, and phospholipid secretion into bile did not appear to be mediated by adenyl cyclase or cyclic AMP, as neither glucagon nor dibutyryl cyclic AMP had any effect on the secretion into bile of bile acids or phospholipid. The administration of cholera toxin was not associated with any increase in the secretion of free choline into bile. Glucagon and dibutyryl cyclic AMP also had no stimulatory effect on the secretion of free choline into bile. The results do not support the hypothesis that the main function of rat liver alkaline phosphatase is to facilitate the excretion of free choline into bile.

0124 EVIDENCE THAT D-GLUCARO-1,4-LACTONE SHORTENS THE PHARMACOLOGICAL ACTION OF DRUGS BEING DISPOSED VIA THE BILE AS GLUCURONIDES.

(Eng.) Marselos, M.; Dutton, G.; Hanninen, O. (Dept. Physiology, Univ. Kuopio, SF-70101 Kuopio 10, Finland). *Biochem. Pharmacol.* 24(20):1855-1858; 1975.

The effect of p.o. administration of D-glucaro-1, 4-lactone (glucarolactone) both on β-glucuronidase activity of male Wistar/AF/Han/Mol/(Han 67) rat intestinal contents (at physiologic pH) and on the biologic activity of glucuronidogenic drugs excreted in the bile or urine was investigated. In addition, inhibition by glucarolactone on β-glucuronidase activity from intestinal mucosa and luminal contents was examined *in vitro* (at physiologic pH). Depression of locomotor activity caused by phenobarbital (80 mg/kg, i.p.) or progesterone (160 mg/kg, i.p.) was shortened in rats pretreated with glucarolactone (1.2 g/kg, p.o.), which had no effect when given alone. The duration of the zoxazolamine paralysis (75 mg/kg, i.p.) was not affected, however, by the presence of glucarolactone. After p.o. administration of glucarolactone, β-glucuronidase was greatly inhibited within 6 hr when measured in luminal contents through the intestinal tract at pH values of 6.5, 7.8, and 7.0, which were those found to exist in the jejunum, the ileum, and the colon, resp. Glucarolactone itself, added *in vitro*, inhibited β-glucuronidase from intestinal epithelial cells and luminal contents. The results suggest that inhibition by glucarolactone of the intestinal bacterial β-glucuronidase could enhance the elimination of substances excreted in the bile as D-glucuronic acid conjugates. This is probably mediated by suppressing the enterohepatic circulation of the pharmacologically active aglycones.

0125 CHANGES IN ADENYLATE ENERGY CHARGE OF THE LIVER AFTER AN ORAL GLUCOSE LOAD.

(Eng.) Kimura, K.; Kamiyama, Y.; Ozawa, K.; Honjo, I. (Kyoto Univ. Faculty Medicine, Sakyo-ku, Kyoto, Japan). *Gastroenterology* 70(5):665-668; 1976.

Changes in the adenine nucleotide metabolism after an oral glucose load were studied in the livers of normal and alloxan-induced (7.0 mg/100 g body weight) diabetic Wistar rats. In the oral glucose tolerance test, 6 ml/kg body weight of 50% glucose were administered intragastrically after a 15-hr fast. Changes in the energy charge were positively correlated with those in the blood glucose and plasma immunoreactive insulin levels. One hour after an oral glucose load when the plasma immunoreactive insulin levels increased maximally, the energy charge increased maximally from 0.846 to 0.867 ($p<0.001$). The increase in the energy charge was accompanied by a concomitant decrease in the ADP levels ($p<0.05$). The respiratory control ratio, state 3 respiration/U of cytochrome a(+a_3), and DNP-induced ATPase activity/U of cytochrome a(+a_3) increased significantly. The adenylate kinase and pyruvate kinase activities in the liver remained unchanged. The energy charge in the liver of alloxan-diabetic rats did not increase significantly after an oral glucose load when compared to saline-treated controls. An increase in the energy charge of the liver may be attributable to the more rapid flux of intermediary metabolism in the enhanced ADP-phosphorylating reactions by mitochondria, owing to an elevated level of insulin available to the hepatic cells.

0126 INHIBITION BY SULFOBROMOPHTHALEIN OF MITOCHONDRIAL TRANSLOCATION OF ANIONS AND ADENINE NUCLEOTIDES: EFFECTS UPON LIVER ADENOSINE TRIPHOSPHATE AND POSSIBLE CORRELATION WITH INHIBITION OF BILE FLOW IN THE RAT.

(Eng.) Laperche, Y.; Oudea, P. (Laboratoire de Pathologie Cellulaire Hepatique, E.R.A. 334, C.N.R.S., U.E.R. de Medecine, 1, rue Gaston Veil, 44035 Nantes Cedex, France). *J. Pharmacol. Exp. Ther.* 197(1):235-244; 1976.

The effects of BSP on male rat (Sprague-Dawley CD strain) liver mitochondria *in vitro*, their extent *in vivo*, and their possible correlation with inhibition of bile flow and BSP secretion into bile were studied. Unconjugated BSP inhibited state III respiration of rat liver mitochondria. It competitively inhibited the translocation into mitochondria of citrate, malate, phosphate, and ADP, as

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studied by the inhibitor stop method. Double-beam spectrophotometry strongly suggested that glutamate translocation was similarly inhibited. After perfusion of 65 µmole/hr/100 g for 90 min, bile flow was inhibited by 82%, and liver ATP fell by 60%. The amount of mitochondrial BSP could be computed from the amount of $[^{35}S]$BSP still bound to mitochondria that were prepared at the end of such experiments; the amount of BSP lost during the isolation procedure was estimated from parallel experiments following binding of BSP *in vitro*. Comparison of the kinetic constants of mitochondrial transport and of their inhibition by BSP, on the one hand, and of liver concentrations of substrates and BSP, on the other, leads to the conclusion that a strong inhibition of transports, mainly of phosphate, occurs *in vivo* and is responsible for the observed decrease of ATP levels. The latter is likely to be at least partially responsible for the concomitant decrease in bile flow.

0127 HEPATIC GLUTATHIONE DEPLETION AND IMPAIRED BROMOSULPHTHALEIN CLEARANCE EARLY AFTER PARACETAMOL OVERDOSE IN MAN AND THE RAT.

(Eng.) Davis, M.; Ideo, G.; Harrison, N. G.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London SE5 8RX, England). *Clin. Sci. Mol. Med.* 49(5):495-502; 1975.

The plasma kinetics of BSP was studied in four patients and Wistar rats following paracetamol overdose and in normal subjects after therapeutic doses. Plasma clearance of BSP was impaired in patients within 8 hr, and in rats within 2 hr of paracetamol overdose (30-40 g and 13.2 nmol/kg, resp.), before biochemical signs of liver damage had appeared. Paracetamol and BSP competed for uptake into the liver and excretion into the bile. Impaired hepatic uptake of BSP was also demonstrated in man at doses of the drug within the therapeutic range (0.3 mmol/kg). In the patients, a smaller proportion of BSP was retained in the plasma as the glutathione conjugate after an overdose than after therapeutic doses. This effect could be reproduced in the rat and was shown to be due to depletion of hepatic glutathione and to impairment in the activity of glutathione-*S*-aryl transferase. These studies provide further evidence that depletion of hepatic glutathione occurs after paracetamol overdose in man and in the experimental animal, allowing the subsequent accumulation and binding of a toxic metabolite of the drug within liver cells. Impaired enzymic conjugation of the toxic metabolite with hepatic-reduced glutathione may also be important in this situation.

0128 LYSOLECITHIN-MEDIATED INFLAMMATORY REACTION IN RABBIT GALLBLADDER: PERMEABILITY INCREASE AND ENZYME LIBERATION.

(Eng.) Sjodahl, R.; Tagesson, C.; Wetterfors, J. (Univ. Hosp., Linkoping, Sweden). *Acta Chir. Scand.* 141(5):403-408; 1975.

Inflammatory changes mediated by lysolecithin were quantitated *in vitro* by studying permeability across the gallbladder wall and lysosomal integrity of four domestic male rabbits. Wall permeability changes were measured as changes in the transmural passage of radioactively labeled hippuran and biligraphin. Acid phosphatase release from wall to lumen was determined using 10 mM *p*-nitrophenylphosphate as substrate. When 6-20 mg/ml lysolecithin were instilled into the gallbladders, dose-dependent increases in permeability and enzyme release occurred. No effects as compared with controls were seen when 2 mg/ml were instilled. Lysolecithin-treated gallbladders showed morphological signs of inflammation as opposed to untreated gallbladders. These data reported are consistent with observations that lysolecithin may cause inflammatory lesions to the gallbladder wall. The authors conclude that this model may prove useful in examining the effects of aggressive and protective agents upon the gallbladder mucous membrane.

0129 SERUM TRANSAMINASE LEVELS AFTER EXPERIMENTAL PARACETAMOL-INDUCED HEPATIC NECROSIS.

(Eng.) Dixon, M. F.; Fulker, M. J.; Walker, B. E.; Kelleher, J.; Losowsky, M. S. (Dept. Pathology, Univ. Leeds, Leeds, England). *Gut* 16(10):800-807; 1975.

The relation between serum transaminase levels and the extent of paracetamol-induced liver necrosis was investigated in Tuck-Wistar rats. Three methods of histological quantitation were used to assess the degree of necrosis: arbitrary grading, point counting, and the image-analysis computer (500,000 picture points/field). Highly significant correlations were obtained from all methods, and all were found to be reproducible. A close correlation was found between the extent of hepatic necrosis and the serum aspartate aminotransferase and alanine aminotransferase 24 hr after a large dose (4 g/kg) of paracetamol. The mean grade of necrosis correlated reasonably well with the serum enzyme levels in the recovery phase at 36 and 72 hr, although the transaminase level for a given degree of necrosis was considerably lower at 72 hr than at 24 hr. These findings suggest that serum transaminase levels give a reliable indication of the severity of hepatic necrosis (even in the recovery phase) if the time of ingestion of paracetamol is taken into account.

0130 ACUTE, SUBACUTE, AND RESIDUAL EFFECTS OF POLYCHLORINATED BIPHENYL (PCB) IN RATS. II. PATHOLOGY AND ELECTRON MICROSCOPY OF LIVER AND SERUM ENZYME STUDY.

(Eng.) Kasza, L.; Weinberger, M. A.; Carter, C.; Hinton, D. E.; Trump, B. F.; Brouwer, E. A. (Division Pathology, Food and Drug Admin., 200 C St., S.W., Washington, DC 20204). *J. Toxicol. Environ. Health* 1(5):689-703; 1976.

A study was undertaken to determine the residual effects of a polychlorinated biphenyl (Aroclor 1254) at dietary concentrations of 0, 5, 50, and 500 ppm in the diet of male rats. The animals were treated for 4 weeks (acute and subacute phase), then observed for periods of up to 50 weeks following termination of exposure (residual phase). The most significant histopathologic alteration was fatty degenerative change in the liver, which was most marked at 9 weeks. Forty-six weeks after exposure, over 50% of the rats fed 500 ppm still demonstrated fatty degenerative changes. Electron microscopy revealed marked increased in lipid vacuoles and smooth endoplasmic reticulum (SER), with a concomitant decrease in rough endoplasmic reticulum (RER) profiles in the animals receiving 50-500 ppm for 4 weeks. Thirty-seven weeks following the exposure period, rats dosed with 50 ppm showed partial recovery toward control morphology (less lipid, less SER, more RER), while those receiving 500 ppm did not. Persistent morphologic alterations included an increase in SER and medium-density lipid material within cisternae of SER, Golgi, and Golgi-condensing vesicles, as well as a decrease in parallel arrays of RER. The persistence of ultrastructural alteration throughout the 46-week residual phase emphasizes the long-lasting effects of 4 weeks of exposure to polychlorinated biphenyl, and that even short-term administration may modify the metabolism of drugs, hormones, and pesticides for long periods of time.

0131 STUDIES ON THE HEPATOTOXICITY OF Aminita phalloides IN THE RAT: 1. LIVER CELL VACUOLATION.

(Eng.) Baccino, F. M.; Cantino, D.; Zuretti, M. F. (Istituto di Patologia Generale dell'Universita, Corso Raffaello 30, I-10125 Torino, Italy). *Exp. Mol. Pathol.* 24(2):159-175; 1976.

The pathogenesis of the hepatocytic vacuolation by *Amanita phalloides* was studied in male Wistar rats, and the time sequence of selected morphological, histochemical, and biochemical changes of hepatocytes and their lysosomes were correlated during the development of the damage. Rats were given mushroom extract (0.5 ml/100 g, i.p.), and light, electron, and fluoresence microscopy and enzyme histochemical techniques were used to study liver damage. The first changes were detected at the level of the hepatocytic plasmalemma, both histochemically (ATPase and 5'-nucleotidase) and ultrastructurally. At the sinusoidal surface, the early development of multiple invaginations, giving rise to cytoplasmic vacuoles, was later followed by the complete disappearance of microvilli. Moreover, microfilaments formed prominent clusters juxtaposed to the inner surface of the plasma membrane at both the sinusoidal and biliary poles. Cytoplasmic vacuoles developed in hepatocytes early after poisoning due to the progressive overloading of cells with plasma proteins and blood cells. Both blood-derived materials finally flooded hepatocytes. Heterophagic and autophagic processes contributed cytoplasmic organelles and glycogen to be segregated into the vacuoles, which thereby acquired an ambiphagosomal character. Autophagosomes were also increased. A large proportion of vacuoles, except for the largest ones in the late stages of the poisoning, acquired acid phosphatase activity; this presumably derived from preexisting lysosomes, which strongly decreased in number. Many vacuoles also contained diastase-resistant, PAS-positive material. Thus, suitable i.p. doses of *A. phalloides* brings about an extensive cytoplasmic vacuolation of rat liver parenchymal cells, followed by cell death with interstitial hemorrhage.

0132 EFFECTS OF FASTING AND REFEEDING ON SECRETORY GRANULES OF THE MOUSE GALLBLADDER EPITHELIUM: A QUANTITATIVE ELECTRON MICROSCOPIC STUDY.

(Eng.) Wahlin, T.; Bloom, G. D.; Carlsoo, B.; Rhodin, L. (Dept. Histology, Univ. Umea, S-901 87 Umea, Sweden). *Gastroenterology* 70(3):353-358; 1976.

Gallbladder epithelial cells of 25 male C57BL mice were studied by electron microscopy during fasting and refeeding to determine if variations in food intake are reflected in epithelial cell secretory activity. Morphometric data were obtained from randomly selected epithelial cells of normal, starved (12, 24, and 48 hr), and refed (12 hr) mice. Deprivation of food significantly diminished the volume density of the mucinous secretory granules by about 70% after 48 hr of fasting. Upon refeeding, this secretory granule parameter increased significantly (approximately 2.5 times). Stereological measurements were also performed on nuclei, mitochondria, and lysosomes, but no major morphometric changes were observed in these organelles. The findings suggest that a basal secretion of mucin granules occurs in the mouse gallbladder, irrespective of the animals' nutritional state and that this discharge during starvation exceeds the formation of new granule material. The mucous secretory activity of the mouse gallbladder is influenced by the nutritional state of the animals and the qualitative composition of the diet.

0133 ALTERED BILE ACID METABOLISM IN VEGETARIANS.

(Eng.) Hepner, G. W. (Milton S. Hershey Medical Center, Pennsylvania State Univ., Hershey, PA 17033). *Am. J. Dig. Dis.* 20(10):935-940; 1975.

To assess the effect of meat on bile acid metabolism, bile acid kinetics were compared in a group of healthy vegetarians (10) and a matched group of healthy control subjects. The daily fractional turnover rate of cholic acid and the deoxycholic acid pool size were significantly smaller in the vegetarians than in the controls. The data suggest that enterohepatic conservation of cholic acid is more efficient in vegetarians than in control subjects resulting in decreased deoxycholic acid input in vegetarian subjects. It is suggested that meat in the diet may lead to an oncogenic effect by increasing the deoxycholic acid pool size and input into the enterohepatic circulation.

0134 CORRELATION OF PLASMA LYSOSOMAL ENZYME LEVELS WITH HEPATIC RETICULOENDOTHELIAL FUNCTION AFTER TRAUMA.

(Eng.) Loegering, D. J.; Kaplan, J. E.; Saba, T. M. (Albany Medical Coll., Albany, NY 12208). *Proc. Soc. Exp. Biol. Med.* 152(1):42-46; 1976.

Plasma lysosomal enzyme levels and hepatic phagocytosis were determined following Noble-Collip drum trauma in male Sprague-Dawley rats. Circulating cathepsin and acid phosphatase activity increased

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after sublethal trauma (300 revolutions), reaching maximal levels at 1-3 hr and returning to pretrauma levels 24 hr after trauma. Hepatic phagocytosis was decreased maximally at 1 hr and recovered to control levels at 24 hr after sublethal trauma. Increasing trauma intensity (100-500 revolutions) resulted in a progressive failure in hepatic Kupffer cell phagocytosis and a progressive increase in plasma lysosomal enzyme levels when tested 60 min post-trauma. A significant inverse correlation was found between the plasma lysosomal enzyme levels and Kupffer cell phagocytosis after trauma.

0135 EFFECT OF AMINO ACID IMBALANCE ON PROTEIN SYNTHESIS OF SKELETAL MUSCLE AND LIVER IN RATS. (Eng.) Noda, K.; Taniguchi, H.; Kitasaka, R. (Dept. Nutrition, Tokushima Univ., Tokushima, Japan). *Nutr. Rep. Int.* 11(2):129-140; 1975.

0136 LIPOGENESIS BY HEPATIC AND ADIPOSE TISSUES FROM MEAL-FED PYRIDOXINE-DEPRIVED RATS. (Eng.) Angel, J. F. (Sch. Home Economics, Univ. British Columbia, Vancouver, B.C., Canada V6T 1W5). *Nutr. Rep. Int.* 11(5):369-378; 1975.

0137 EFFECT OF 3-MERCAPTOPICOLINIC ACID ON GLUCONEOGENESIS AND GLUCONEOGENIC METABOLITE CONCENTRATIONS IN THE ISOLATED PERFUSED RAT LIVER. (Eng.) Goodman, M. N. (Harvard Medical Sch., Boston, MA). *Biochem. J.* 150(1):137-139; 1975.

0138 EXERCISE AND LIVER INJURY INDUCED BY HIGH CHOLESTEROL DIET. (Eng.) Bane, J. W.; Conn, J. H. (Univ. Mississippi Medical Center, Jackson, MS). *Surg. Forum* 24:393-395; 1973.

0139 MECHANISM OF IMPAIRED DIURESIS IN DOG WITH LIVER DISEASE SECONDARY TO BILE DUCT OBSTRUCTION. (Eng.) Melman, A.; Massry, S. (UCLA Medical Center, Los Angeles, CA). *Surg. Forum* 24: 398-399; 1973.

0140 PRODUCTION OF LITHOGENIC BILE IN RHESUS MONKEYS BY ESTROGENS. (Eng.) Lynn, J.; O'Brien, J. J.; Williams, L. F., Jr. (Boston Univ. Medical Center, Boston, MA). *Surg. Forum* 24:404-406; 1973.

0141 ANALYSIS OF BILE FORMATION IN GUINEA PIGS. (Eng.) Fisher, W. S.; Smith, B. M.; Jones, R. S. (Duke Univ. Medical Center, Durham, NC). *Surg. Forum* 24:407-408; 1973.

0142 EFFECTS OF PROTEIN CONTENT OF DIET AND CORTISOL TREATMENT ON UPTAKE OF ARGININE BY RAT LIVER. (Eng.) Briggs, S.; Freedland, R. A. (Dept. Physiological Sci., Univ. California, Davis, CA 95616). *J. Nutr.* 105(9):1215-1220; 1975.

0143 DEMONSTRATION OF A SPECIFIC METABOLIC EFFECT OF DIETARY DISACCHARIDES IN THE RAT. (Eng.) Michaelis, O. E.; Nace, C. S.; Szepesi, B. (Nutrition Inst., U.S. Dept. Agriculture, Beltsville, MD 20705). *J. Nutr.* 105(9):1186-1191; 1975.

0144 EFFECTS OF 3-ACETOXYL FUSIDATE ON THE BILIARY SECRETION OF LIPIDS IN THE RAT. (Eng.) Montet, J. C.; Montet, A. M.; Gerolami, A.; Hauton, J. C. (INSERM U-130, Marseille, France). *Biol. Gastroenterol. (Paris)* 8(1):53-62; 1975.

0145 EFFECT OF SIREPAR, A BOVINE LIVER HYDROLYZATE, ON LIVER FUNCTION IN EXPERIMENTAL TOXIC HEPATITIS INDUCED WITH CARBON TETRACHLORIDE. (Rus.) Oleinik, A. N.; Skakun, L. N. (Ternopol Medical Inst., Ternopol, USSR). *Vrach. Delo* (6):13-14; 1975.

0146 ROLE OF PRIMARY INDUCER METABOLISM IN THE ACTION MECHANISM OF 3-METHYLCHOLANTHRENE AND PHENOBARBITAL. (Rus.) Tsyrlov, I. B.; Zakharova, N. E.; Liakhovich, V. V. (Inst. Clinical Experimental Medicine, Novosibirsk, USSR). *Dokl. Akad. Nauk SSSR* 223(1):237-239; 1975.

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0148 PHOSPHATIDYLETHANOLAMINE IN LIVER MITOCHONDRIA AND ENDOPLASMIC RETICULUM: MOLECULAR SPECIES DISTRIBUTION AND TURNOVER. (Eng.) Parkes, J. G.; Thompson, W. (Dept. Bacteriology, Univ. California, Los Angeles, CA 90024). *Can. J. Biochem.* 53(6):698-705; 1975.

0149 HEPATIC POTASSIUM MOVEMENTS INDUCED BY SYMPATHOMIMETIC AMINES BEFORE AND AFTER ADRENERGIC BLOCKADE. (Eng.) Guthrie, S. D.; Murphy, Q. R. (Univ. Wisconsin Medical Sch., Madison, WI 53706). *Proc. Soc. Exp. Biol. Med.* 149(2):554-558; 1975.

0150 STUDIES ON GLUCONEOGENESIS AND PROTEIN SYNTHESIS IN ISOLATED HEPATOCYTES. (Eng.) Wagle, S. R.; Ingebretsen, W. R., Jr. (Indiana Univ. Sch. Medicine, Indianapolis, IN 46202). *Proc. Soc. Exp. Biol. Med.* 149(2):480-485; 1975.

0151 DRUG-INDUCED ALTERATIONS IN HEPATIC FATTY ACID DESATURASE ACTIVITY. (Eng.) Montgomery, M. R.; Holtzman, J. L. (Veterans Admin. Hosp., Minneapolis, MN 55417). *Biochem. Pharmacol.* 24(13/14):1343-1347; 1975.

0152 THE EFFECT OF FENFLURAMINE AND ITS DERIVATIVES ON TRIGLYCERIDE SECRETION BY THE LIVER OF THE RABBIT. (Eng.) Kaye, J. P.; Galton, D. J.; Tomlin, S. (St. Bartholomew's Hosp., London, England). *Postgrad. Med. Sch.* 51(Suppl. 1): 95-99; 1975.

0153 CANINE GALLBLADDER BILE: EFFECTS OF PROXIMAL GASTRIC VAGOTOMY, TRUNCAL VAGOTOMY, AND TRUNCAL VAGOTOMY WITH PYLOROPLASTY ON VOLUME AND COMPOSITION. (Eng.) Wilbur, B. G.; Gomez, F. C.; Tompkins, R. K. (UCLA Sch. Medicine, Los Angeles, CA 90024). *Arch. Surg.* 110(7):792-796; 1975.

0154 EFFECT OF BILE DUCT LIGATION AND LIGATION OF THE PORTAL VEIN ON LIVER REGENERATION IN RATS. (Eng.) Najjar, F.; Ilbawi, M.; Noltenius, H. (Dept. Surgery, American Univ., Beirut, Lebanon). *Leb. Med. J.* 27(6):703-712; 1974.

0155 EFFECT OF ETHANOL ON THE HUMAN LIVER. (Slo.) Zajacova, O.; Brixova, E. (Medical Faculty, Comenius Univ., Hlboko 11, 801 00, Bratislava, Czechoslovakia). *Bratisl. Lek. Listy* 62(6):753-759; 1974.

0156 INHIBITORY ACTIVITY OF PROTEIN FRACTIONS ISOLATED FROM RAT LIVER ON COMPENSATORY HYPERTROPHY OCCURRING AFTER PARTIAL HEPATECTOMY. (Fre.) Higueret, P.; Chany, E.; Mousset, S.; Gardes, M.; Frayssinet, C. (Institut de Recherches Scintifiques sur le Cancer, B.P. no. 8, 94800 Villejuif, France). *C. R. Acad. Sci.* [*D*] *(Paris)* 281(1): 49-52; 1975.

0157 EFFECT OF TROMETHAMINE, ISOPRENALINE, AND PROPRANOLOL ON BLOOD FLOW AND RESISTANCE IN THE LIVER AFTER THE CLAMPING OF AFFERENT AND EFFERENT BLOOD VESSELS: RELATION TO SPLANCHNIC SHOCK. (Fre.) Stoitchcov, E.; Kawai, T.; Boissel, P.; Bleser, F.; Benichoux, R. (C.H.U. de Brabois, 54500 Vandoeuvre-les-Nancy, France). *J. Chir. (Paris)* 109(3):369-386; 1975.

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0159 INHIBITION OF TRITIATED THYMIDINE INCORPORATION INTO CELL CULTURES OF FETAL RAT LIVER BY A FRACTIONATED LIVER EXTRACT. (Fre.) Berneman, A.; Ellouz, R.; Lenfant, M.; Garcia Giralt, E. (Institut de Chimie des Substances Naturelles, CNRS, 91190 Gif-sur-Yvette, France). *C. R. Acad. Sci.* [*D*] *(Paris)* 281(2/3):187-190; 1975.

0160 ACTIVATION OF GLYCOGEN SYNTHETASE IN THE LIVER OF RATS TREATED WITH THYROID HORMONE. (Ita.) Taningher, M.; Gallo, G.; Fugassa, E.; Pranzetti, P. (Istutito di Fisiologia generale, Universita di Genova, Italy). *Boll. Soc. Ital. Biol. Sper.* 50(22):1911-1917; 1974.

0161 FREE FATTY ACIDS AND BILIRUBIN METABOLISM. (Fre.) Odievre, M. (Unite de Recherche d'Hepatologie Infantile, INSERM U-56, F 94270 Bicetre, France). *Biol. Gastroenterol.* 8(2):93-98; 1975.

0162 CHANGES IN THE RNA SYNTHESIZING ABILITY OF ISOLATED NUCLEI AND MATRIX ACTIVITY OF RAT LIVER CHROMATIN IN THE PRESENCE OF CYCLOHEXIMIDE AS AN INHIBITOR OF PROTEIN BIOSYNTHESIS. (Rus.) Todorov, I. N.; Galkin, A. P.; Shen, R. A.; Zheliabovskaia, S. M. (Inst. Chemical Physics, Chernogolovka, Moscow Region, USSR). *Dokl. Akad. Nauk SSSR* 223(6): 1488-1491; 1975.

0163 DECREASE IN CARBON TETRACHLORIDE TOXICITY CAUSED BY SIMULTANEOUS ADMINISTRATION OF N,N'-DIPHENYL-p-PHENYLENE DIAMINE. (Fre.) Le Bars, H.; de Laistre Banting, A. (Ecole Nationale Veterinaire, 7, avenue du General de Gaulle, 94701 Maisons-Alfort, France). *C. R. Acad. Sci.* [*D*] *(Paris)* 280(21):2499-2502; 1975.

0164 BILIRUBIN METABOLISM: III. HEPATIC EXCRETION OF BILIRUBIN. THE FATE OF BILIRUBIN IN THE INTESTINE. (Spa.) Candel Monserrate, I. (Facultad Medicina, Universidad Complutense, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 45(5): 571-584; 1975.

0165 EFFECTS OF CHRONIC ALCOHOL INTOXICATION UPON CITRATE AND ISOCITRATE METABOLISM IN ISOLATED RAT LIVER MITOCHONDRIA [Abstract]. (Eng.) Oudea, P.; Oudea, M. C. (CNRS ERA 334, Centre Hospitalo-Universitaire, F-44000 Nantes, France). *Digestion* 10(3):236; 1974.

0166 BILE SECRETION AND BILIARY EXCRETION OF ORGANIC ANIONS IN THE FASTED RAT [Abstract]. (Eng.) Mahu, J. L.; Dhumeaux, D.; Duvaldestin, P.; Berthelot, P. (INSERM U-99, Hopital Henri Mondor, F-94010 Creteil, France). *Digestion* 10(3):230; 1974.

0167 STUDY OF THE TOLERANCE OF HEPATIC CELLS TO ANOXIA [Abstract]. (Eng.) Lambotte, L.; Pontegnie-Istace, S.; Otte, J. B. (Lab. Experimental Surgery, 69, rue de Bruxelles, B-3000 Louvain, Belgium). *Digestion* 10(3):226-227; 1974.

See also, 0007, 0037, 0045, 0056, 0170, 0289, 0578, 0599, 0647, 0749.

SECRETION AND METABOLISM

Intestine

0168 A STUDY OF INTRALUMINAL PEPTIDE HYDROLASE ACTIVITY IN THE RAT.

(Eng.) Silk, D. B. A.; Kim, Y. S. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *Clin. Sci. Mol. Med.* 49(5):523-526; 1975.

A potential source of luminal peptide hydrolase activity was investigated and the hydrolysis of two further peptides by jejunal and ileal contents was compared in male Wistar rats. Uncentrifuged and centrifuged rat intestinal contents were assayed for peptide hydrolase activity with glycyl-L-phenylalanine (Gly-Phe) and L-phenylalanyl-glycine (Phe-Gly) as substrates in the absence and presence of the intestinal cytosol peptide hydrolase inhibitor *p*-hydroxymercuribenzoate (PHMP, 500 μM). Jejunal contents hydrolyzed Gly-Phe faster than Phe-Gly. Conversely, ileal contents hydrolyzed Phe-Gly faster than Gly-Phe. PHMP markedly inhibited jejunal peptide hydrolase activity. There was ten times as much PHMB-resistant activity towards both dipeptides in ileal contents as in jejunal contents. Most of the luminal enzyme activity (89-96%) was present in the supernatants after centrifugation, indicating that the luminal enzymes exist in the soluble form. Although the presence of soluble bacterial enzymes cannot be excluded, peptide hydrolase enzymes in jejunal contents have the characteristics of mucosal cytosol enzymes, whereas enzymes in ileal contents have the characteristics of mucosal brush border as well as cytosol enzymes.

0169 INTESTINAL DISACCHARIDASE AND PEROXIDASE ACTIVITIES IN PARENTERALLY NOURISHED RATS.

(Eng.) Castro, C. A.; Copeland, E. M.; Dudrick, S. J.; Johnson, L. R. (Univ. Texas Medical Sch., Houston, TX 77025). *J. Nutr.* 105(6):776-781; 1975.

The importance of the presence of food in the gastrointestinal tract in maintaining normal enzyme activity in the small intestine was investigated in male Sprague-Dawley rats that were kept from eating for as long as 2 weeks. During this time animals were sustained on a nutrient solution administered i.v. Enzyme activity and small bowel mass in these animals and similar parameters in rats administered the same solution p.o. were compared with control groups fed an essentially isoenergetic diet of stock rat food and water. Disaccharidase and peroxidase levels in mucosal scrapings expressed as activity/mg protein, activity/intestine, and activity/100 g body weight were significantly reduced in nourished rats but not in rats receiving the nutrient solution p.o. The activities of maltase, sucrase, trehalase, palatinase, and lactase, as well as peroxidase, were significantly reduced in parenterally nourished rats as compared with controls. In addition, parenteral feeding was accompanied by a significant reduction in the small bowel weight:body weight ratio as compared with that of rats fed the stock diet or nutrient solution p.o. The results support the conclusion that normal activity of intestinal enzymes spatially distributed with regard to depth within the mucosa depends on the presence of food in the gastrointestinal tract and cannot be maintained at normal levels by total i.v. nutrition.

0170 METABOLIC HETEROGENEITY OF LECITHINS IN INTESTINE.

(Eng.) Akino, T.; Ohno, K. (Sapporo Medical Coll., Sapporo, Japan). *Tohoku J. Exp. Med.* 116:385-389; 1975.

The incorporation of [2-^{3}H]-glycerol and lysolecithin labeled with [2-^{3}H]-glycerol into lecithin and its subspecies was investigated into epithelial and muscular layers of rat small intestine. The labeled compounds were administered either by intraduodenal injection or injection into femoral vein. The incorporation of glycerol into lecithin was distinctly higher in the epithelial layer than in the muscular layer 5 and 20 min following injection by both routes, but the incorporation of lysolecithin into lecithin showed no marked differences between both layers. Among lecithin species, dienoic and monoenoic species were highly labeled with the injection of labeled glycerol, and dienoic as well as tetraenoic species were markedly labeled with the injection of labeled lysolecithin. However, no significant difference was found in the incorporation pattern of any labeled compound into lecithin between both layers and between both administration routes.

0171 EFFECT OF Klebsiella pneumoniae ENTEROTOXIN ON INTESTINAL TRANSPORT IN THE RAT.

(Eng.) Klipstein, F. A.; Horowitz, I. R.; Engert, R. F.; Schenk, E. A. (Tropical Malabsorption Unit, Univ. Rochester, NY 14642). *J. Clin. Invest.* 56(4):799-807; 1975.

The effects on intestinal transport (net fluid and electrolyte secretion) of either a semipurified preparation of enterotoxin elaborated by *Klebsiella pneumoniae* serotype 5 or similarly prepared control material were tested by marker perfusion studies in the jejunum and ileum of Sprague-Dawley rats. Enterotoxin (2 mg/ml) produced net secretion of water, Na, and Cl in both jejunal and ileal segments; HCO_3 transport was not affected. Net secretion was evident within 30 min after introduction of the toxin and was maximal after 90 min. The addition of 56 mM glucose to the enterotoxin-containing perfusion fluid resulted in reversal of water and Na transport to net absorption in both intestinal segments. The enterotoxin also produced a significant depression of xylose absorption in both the jejunum and ileum but did not affect the absorption of either glucose of L-leucine. Intestinal structure was not altered after perfusion of the toxin but instillation of approximately one-fourth of the total perfusion dose into a ligated jejunal loop for 18 hr produced fluid secretion and structural abnormalities. These observations confirm that other species of coliform bacteria in addition to *Escherichia coli* are capable of elaborating an enterotoxin. The authors suggest that chronic exposure of the intestinal mucosa to the enterotoxin elaborated by these bacteria may be a factor in the pathogenesis of intestinal abnormalities in cases of acute undifferentiated diarrhea or diarrhea associated with either acute gastroenteritis or chronic malnutrition.

0172 DIFFERENCES IN THE ENZYMIC, POLYPEPTIDE, GLYCOPEPTIDE, GLYCOLIPID AND PHOSPHOLIPID COMPOSTIONS OF PLASMA MEMBRANES FROM THE TWO SURFACES OF INTESTINAL EPITHELIAL CELLS [Abstract]. (Eng.) Lewis, B. A.; Gray, G. M.; Coleman, R.; Michell, R. H. (Dept. Biochemistry, Univ. Brimingham, P.O. Box 363, Birmingham B15 2TT, U.K.). *Biochem. Soc. Trans.* 3(5):752-753; 1975.

0173 THE PURIFICATION OF PORCINE ENTEROKINASE BY AFFINITY CHROMATOGRAPHY [Abstract]. (Eng.) Grant, D. A. W.; Hermon-Taylor, J. (London Hosp., London, England). *Mayo Clin. Proc.* 50(9): 535; 1975.

0174 THE EFFECT OF COLCHICINE ON INTESTINAL LIPOPROTEIN SECRETION [Abstract]. (Eng.) Glickman, J. L.; Perotto, J. L.; Kirsch, K. (Massachusetts General Hosp., Boston, MA). *Clin. Res.* 23(3):249A; 1975.

0175 METABOLISM OF CHENODEOXYCHOLATE (CDC) BY INTESTINAL MUCOSA [Abstract]. (Eng.) Rachmilewitz, D.; Saunders, D. R. (Dept. Medicine, Univ. Washington, Seattle, WA). *Clin. Res.* 23(3): 254A; 1975.

0176 THE EFFECT OF INTRALUMINAL PO_2 ON THE COLONIC BACTERIAL FLORA [Abstract]. (Eng.) Bond, J. H.; Beggs, W.; Levitt, M. D. (Veterans Admin. Hosp., Minneapolis, MN). *Clin. Res.* 23(3): 246A; 1975.

0177 THE EFFECT OF HYPOTENSIVE DRUGS (SERPASIL) ON THE HISTOCHEMICAL REACTIONS IN THE SMALL INTESTINE OF WHITE RATS. (Eng.) Krolikowska-Prasal, I.; Tarach, J. S. (Medical Academy, ul. Dymitrowa 11, 20-080 Lublin, Poland). *Pathol. Eur.* 10(2):167-172; 1975.

0178 RADIOTELEMETRIC MONITORING OF HYDROGEN ION LEVELS OF THE SMALL INTESTINE. (Eng.) Alday, E. S.; Goldsmith, H. S. (Jefferson Medical Coll., Philadelphia, PA). *Surg. Gynecol. Obstet.* 141(4):549-551; 1975.

0179 THE EFFECT OF STRESS ON PARIETAL SUCROSE HYDROLYSIS IN RATS. (Rus.) Lazoyskaya, A. V. (USSR Ministry of Health, Leningrad, USSR). *Biull. Eksp. Biol. Med.* 79(6):38-40; 1975.

See also, 0007, 0012, 0015, 0020, 0043, 0183.

SECRETION AND METABOLISM

GENERAL

0180 EFFECTS OF POTASSIUM IONS AND SODIUM IONS ON MEMBRANE POTENTIAL OF EPITHELIAL CELLS IN RAT DUODENUM. (Eng.) Okada, Y.; Sato, T.; Inouye, A. (Kyoto Univ. Sch. Medicine, Kyoto, 606, Japan). *Biochim. Biophys. Acta* 413(1):104-115; 1975.

The effect of K^+ and Na^+ concentration changes on the potential profiles of rat duodenum membrane was analyzed. Mucosal and serosal membrane potentials (V_m and V_s) of epithelial cells in the duodenum were recorded together with the transmural potential differences (PD_t). The value of V_m in the duodenum at 37 C was approximately -53 mV. When Cl^- in the mucosal medium was partially replaced with SO_4^{2-} at fixed mucosal Na^+ and K^+ concentrations ($[Na^+]_m$ and $[K^+]_m$), the membrane potential was scarcely affected in the steady state several minutes after replacement, whereas marked changes in the potential were observed with varying $[K^+]_m$ or $[Na^+]_m$. As the mucosal K^+ concentration increased at constant $[Na^+]_m$, V_m was gradually decreased (depolarization), together with the increase in PD_t. At constant $[K^+]_m$, an increase in $[Na^+]_m$ also caused the decrease of V_m for the lower $[K^+]_m$ region, whereas V_m was not affected by such changes in $[Na^+]_m$ in the range of $[K^+]_m$ higher than approximately 60 mM. The values of P_{Na}/P_K were obtained from the modified Goldman equation under an appropriate assumption. The ratio of the permeability coefficients markedly increased from zero to approximately 0.07 with a decrease in $[K^+]_m$. The authors attribute their elevated values of membrane potential (compared to previous experiments with rat, hamster, rabbit, and tortoise intestine) to the preservation of the intact normal blood supply until the tissue was mounted.

0181 INTERSTITIAL FLUID PRESSURE AND ALKALINE GASTRIC SECRETION. (Eng.) Altamirano, M.; Requena, M.; Perez, T. C. (Sch. Medicine, Univ. Puerto Rico, San Juan, PR). *Am. J. Physiol.* 229(5):1421-1426; 1975.

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The interstitial fluid pressure (IFP) of the submucosa of the gastric fundus was monitored by means of Guyton's capsules in dogs anesthetized with pentobarbital to determine whether hydraulic gradients generated by changes in the IFP cause secretion of interstitial fluid (IF). The intracapsular pressure (ICP) was measured during secretion produced by: a) hypertonic solutions placed inside the stomach, b) arterial hypertension (200 mm Hg) applied during intra-arterial infusion of histamine, and c) intra-arterial infusion of acetylcholine. The first procedure did not modify the ICP. The mean ICP increased, mostly due to augmented capillary filtration, whenever interstitial fluid appeared in the gastric lumen during hypertension plus histamine. The hydraulic coefficient measured in these experiments was at least four orders of magnitude larger than the respective osmotic coefficient. The action of acetylcholine was complex; large doses enlarged the net capillary filtration, but small doses increased the mean ICP by muscle stimulation only. The authors suggest that contraction of the muscularis mucosae may be the most important mechanism underlying bulk flow of interstitial fluid in physiological conditions. It is concluded that hydraulic gradients across the epithelium might account for the "secretion" of "alkaline" juice.

0182 ADRENERGIC MECHANISMS IN CANINE GASTRIC CIRCULATION. (Eng.) Zinner, M. J.; Kerr, J. C.; Reynolds, D. G. (Walter Reed Army Medical Center, Washington, DC 20012). *Am. J. Physiol.* 229(4):977-982; 1975.

The effects of adrenergic amines administered by direct intra-arterial injections over a logarithmic dose range on the stimulation and blockade of gastric circulation were studied in 10 anesthetized dogs. Blood flow through the right and left gastric artery was measured electromagnetically. Norepinephrine and isoproterenol (both at 10^{-3}-10^{0} μg/kg) were injected intra-arterially and i.v. before and after alpha- and beta-adrenergic blockade. Isoproterenol caused vasodilation of both right and left gastric circulations, this effect was attenuated by beta blockade. Epinephrine and norepinephrine induced constriction followed by dilation in both circulations. The constrictor components were attenuated or abolished by alpha-adrenergic blockade (induced by 1.5 mg/kg phenoxybenzamine hydrochloride), and the dilator components were attenuated by beta-adrenergic blockade (induced by 0.5 mg/kg i.v. propranolol). The left gastric circulation had a greater vasodilator response to each adrenergic amine than did the right gastric circulation to the same dose of amine. These data support the classical concepts that epinephrine and norepinephrine are "mixed" adrenergic agonists while isoproterenol is a "pure" beta-adrenergic agonist. These data further suggest that there is an unequal distribution of beta-adrenergic receptors in the left gastric vasculature.

0183 EFFECT OF SECRETIN AND CHOLECYSTOKININ ON SMALL INTESTINAL BLOOD FLOW DISTRIBUTION. (Eng.) Fara, J. W.; Madden, K. S. (Health Sci. Center, State Univ. New York, Stony Brook, NY 11794). *Am. J. Physiol.* 229(5):1365-1370; 1975.

The relative blood flow distribution to the mucosa, submucosa, and muscularis of the small intestine of fasted, anesthetized cats was determined using radioactive microspheres (^{85}Sr) during control periods and periods of increased superior mesenteric blood flow. I.v. infusions of secretin (2-10.7 U/kg·hr), cholecystokinin (CCK, 0.5-6.5 U/kg·hr), or isoproterenol (2.5-5.5 μg/min) increased superior mesenteri blood flow by 15-85%. The microspheres, 15 μm in diameter, were injected into the superior mesenteric artery and shortly thereafter intestinal segments were removed and dissected into mucosal, submucosal, and muscularis fractions. During secretin-induced mesenteric vasodilatation there was a significant redistribution of blood away from the jejunal mucosa to the submucosa. During CCK and isoproterenol infusions there were significant increases in mucosal and decreases in submucosal blood flow. No significant changes were observed in muscularis flow. There was no apparent relation between the percent increase in submucosal blood flow and the relative blood flow distribution changes observed. The results indicate that while secretin, CCK, and isoproterenol increase superior mesenteric blood flow, they also affect blood flow distribution within the mucosa and submucosa.

0184 A HYPOTHESIS FOR THE PATHWAY OF THE THERMALLY-INDUCED UNFOLDING OF BOVINE PANCREATIC RIBONUCLEASE. (Eng.) Burgess, A. W.; Scheraga, H. A. (Dept. Chemistry, Cornell Univ., Ithaca, NY 14853). *J. Theor. Biol.* 53(2):403-420; 1975.

0185 LACK OF EFFECT OF CECECTOMY ON OXYGEN CONSUMPTION AND COLONIC TEMPERATURE OF GERMFREE RATS. (Eng.) Levenson, S. M.; Kan, D. (Albert Einstein Coll. Medicine, Yeshiva Univ., Bronx, NY 10461). *J. Nutr.* 105(10):1237-1240; 1975.

0186 PROTECTION AGAINST CHOLERA: A BACTERICIDAL MECHANISM ON THE MUCOSAL SURFACE OF THE SMALL INTESTINE OF MICE. (Eng.) Knop, J.; Rowley, D. (Dept. Microbiology, Univ. Adelaide, Adelaide, S.A. 5001). *Can. J. Exp. Biol. Med. Sci.* 53(2):155-165; 1975.

0187 EFFECTS OF MANIPULATION, DISTENSION AND PHYSOSTIGMINE ON COMPARTMENTAL BLOOD FLOW IN THE CANINE G-I TRACT. (Eng.) Grassmick, B.; Chou, C. C. (Dept. Physiology, Michigan State Univ., East Lansing, MI). *Fed. Proc.* 34(3):460; 1975.

0188 EFFECT OF DECOMPRESSION ON THE GASTROINTESTINAL TRACT. (Pol.) Bembnowski, B.; Sokolowski, E. (Military Inst. Aviation Medicine, Warsaw, Poland). *Postepy Astronaut.* 8(1):27-35; 1975.

See also, 0021, 0047, 0341.

DIAGNOSTIC PROCEDURES

0189 MEASUREMENT OF FAT ABSORPTION UTILIZING ^{131}IODINE-TRIOLEIN AND NONABSORBABLE RADIOACTIVE MARKERS. (Eng.) Shafer, R. B.; Onstad, G. R. (Veterans Admin. Hosp., Minneapolis, MN 55417). *Am. J. Med. Sci.* 269(3):327-331; 1975.

A double-isotope technique utilizing ^{131}I-triolein and a nonabsorbable marker, ^{131}barium sulfate (^{131}Ba) was employed for the quantitative determination of fecal fat in man. The ratios of radioactivity of ^{131}Ba/^{131}I in a prepared capsule and that found in a random "grab" stool specimen after oral administration of the capsule were compared to determine the amount of fat absorbed. In an initial 36 patients, this technique accurately separated normal from abnormal fat absorption as determined by the usual methods of quantitative fecal fat measurement. Results in an additional 102 patients and in 26 normal subjects accurately reflected their clinical states. In addition, *in vitro* studies demonstrated more complete recovery of added lipid (99%) by radioactive techniques than by chemical analysis (86%). The authors conclude that the double-label technique seems to be more accurate than usual quantitative fecal fat determinations, and that it greatly simplifies the measurement of fat absorption in man by eliminating the need for special diets, quantitative stool collections, and chemical analysis of stool.

0190 INTRAVENOUS CHOLANGIOGRAPHY: OPTIMUM DOSAGE AND METHODOLOGY. (Eng.) Scholz, F. J.; Johnston, D. O.; Wise, R. W. (Peter Bent Brigham Hosp., Boston, MA). *Radiology* 114(2):513-518; 1975.

The effect of varying doses of methylglucamine iodipamide (Cholografin) on visualization of the cholangiogram and toxicity was investigated in 442 patients. Cholangiography was performed using four dosage regimens of Cholografin: a single injection, 10.4 g in 20 ml for 10 min (150 subjects); a single dilute dose, 10.4 g in 40 ml for 30 min (76 subjects); a very dilute single dose, 10.4 g in 100 ml for 30 min (71 subjects); or one dilute double dose, 20.8 g in 80 ml for 30 min (145 subjects). There was no significant difference in the unsuccessful examination rate among the four dosage groups. Opacification was maximum with the double-dose infusion (58.6% good visualization); however, visualization was better with the single-dose injection (52%) than with the two single-dose infusions (41.5%). The double-dose infusion produced more dermal reactions than either the single-dose injection or the single-dose infusion. In 149 of the patients given a single dose, the SGOT levels were determined following cholangiography. The incidence of SGOT elevation with the double-dose infusion was twice that with the other methods. It is concluded that the standard method of administering Cholografin, injecting 20 ml at a steady rate over a 10-min period, is the best technique, despite slightly lower opacification.

0191 COMPLICATIONS OF ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY (ERCP): A STUDY OF 10,000 CASES. (Eng.) Bilbao, M. K.; Dotter, C. T.; Lee, T. G.; Katon, R. M. (Univ. Oregon Health Sci. Center, Portland, OR). *Gastroenterology* 70(3):314-320; 1976.

Inquiries were mailed to 402 owners of the cannulating duodenoscope requesting information concerning complications that occurred during endoscopic retrograde cholangiopancreatography (ERCP) examinations. Fifty-five percent of the owners responded and of these, 25% had not yet attempted any ERCP's. Specific data on complications were analyzed for 8,681 ERCP's of the 10,435 cases reported. The overall cannulation success rate was 70%. The overall complication rate was 3%, and the overall death rate was 0.2%. Clinically evident acute pancreatitis developing within 24 hr was the commonest complication, occurring in 1% of the cases. Suggestions to decrease this complication include: limit pancreatic injection to a slow dribble, fluoroscopically monitored, stopping as soon as branch ducts are seen; wait for pancreatic emptying before reinjecting; limit the number of injections; check in each case for a urogram; and where a urogram is noted, allow the patient only parenteral feeding overnight. Cholangitic sepsis was reported in 0.8% of the cases. Prompt surgical relief of obstruction (24-48 hr) was the most important preventive measure. Pancreatic sepsis/pseudocyst abscess was reported in 0.3%. Suggestions for preventing this complication include antibiotics, underinjection of ducts, decompression operation, and aseptic techniques. Instrumental injury occurred in 0.2%, usually in patients whose anatomy was abnormal or confusing. Drug reactions were reported in 0.6% of the cases, diazepam being the most common offender. Examination failure occurred in 30% of the attempted ERCP's. Promising techniques for preventing complications in ERCP studies include monometric injection monitoring, prophylactic antibiotic use, and special training programs in ERCP.

0192 HYPERAMYLASAEMIA AFTER DUODENOSCOPY AND RETROGRADE CHOLANGIOPANCREATOGRAPHY. (Eng.) Skude, G.; Wehlin, L.; Maruyama, T.; Ariyama, J. (Univ. Lund, Malmo General Hosp., Malmo, Sweden). *Gut* 17(2):127-132; 1976.

The salivary and pancreatic isoamylases of serum were determined separately, before and after 234 duodenoscopy and retrograde cholangiopancreatography examinations, in 219 patients with suspected duodenal, pancreatic, or hepatic disease. Successful pancreatic opacification was associated with pathologically high pancreatic serum amylase activities in 60% of the cases. Extensive opacification was associated with large increases of pancreatic serum isoamylases; the maximal rise recorded was 40 times the initial value. In spite of these striking chemical events only two patients developed clinical acute pancreatitis. There were some variations in pancreatic opacification and in the elevation of pancreatic serum amylase, which seemed to depend upon the particular contrast material used. A rise of the salivary serum isoamylases caused pathologically high total serum amylase activities in 7% of the cases. High levels of pancreatic serum isoamylase activity before the time of examination did

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not result in any different pattern of hyperamylasemia.

0193 AN EVALUATION OF ECHOGRAPHY IN THE DIAGNOSIS OF PANCREATIC DISEASE. (Eng.)

Fontana, G.; Bolondi, L.; Conti, M.; Plicchi, G.; Gullo, L.; Caletti, G. C.; Labo, G. (Medical Clinic II, Univ. Bologna, Bologna, Italy). *Gut* 17(3):228-234; 1976.

The efficacy of echography as a tool in the diagnosis of pancreatic disease was studied in 52 patients, and the results were compared with those from other diagnostic techniques. In 65.7% of the 42 chronic pancreatitis patients, and in all 7 cases of carcinoma of the pancreas, echography provided evidence of pancreatic abnormality but in no case could an unambiguous diagnosis of the disease be made. However, in all three cases of pancreatic cyst, echography gave precise and unequivocal diagnostic information. There was good agreement between the echographic picture and surgical findings. Cholangiography and duodenography indicated duodenal and choledochal compression in a high proportion of cases in which echography revealed enlargement of the head of the pancreas. It is concluded that echography is a simple, safe, and valuable addition to the techniques available for studying the pancreas.

0194 LIMITATIONS OF ULTRACENTRIFUGATION AND IN VIVO DIALYSIS AS METHODS OF STOOL ANALYSIS. (Eng.)

Owens, C. W. I.; Padovan, W. (Univ. Coll. Hosp. Medical School, London, England). *Gut* 17(1):68-74; 1976.

Human fecal analyses were made to validate high speed centrifugation and *in vivo* dialysis as methods of sampling extracellular stool fluid. Feces, free from urine, collected from nine healthy males were used to assess the difference between ultracentrifugate and dialysate (the U-D difference). Amino acid analysis by cation exchange chromatography demonstrated highly significant U-D differences for some amino acids, but not for others, e.g., phenylalanine, citrulline, isoleucine, valine, alanine, and tyrosine were present in higher concentrations after handling and centrifuging. Sonication of diluted stool exaggerated the U-D differences for various amino acids; dilution, itself, was not responsible. There were no significant differences between the ionic concentrations of potassium, sodium, or chloride in centrifugate and dialysate. Sonication did not increase the potassium concentration significantly, explained by a lack of reproducibility in the analytical method and the similarity of the intra- and extracellular concentrations. The U-D difference was not explained by the diffusion characteristics of the dialysis bag. Low speed (6,000 x *g*) supernatants had slightly higher amino acid concentrations than did their 26,000 x *g* or 40,000 x *g* counterparts. The higher values were attributed to cloudy supernatants containing cells that subsequently ruptured. The main differences were seen in glutamate and alanine. Incubation under oxygen or air, as opposed to nitrogen, caused release of certain amino acids. It was concluded that both methods of stool water sampling have limitations and that aerobically prepared ultracentrifugate is probably not equivalent to stool water. Under suitable conditions, *in vivo* dialysis provides the most convenient and accurate method of stool water sampling and the closest approximation to extracellular fluid, providing the feces remain in the descending colon or rectum for at least 2 hr. If this is not possible, then centrifugation is an alternative providing the stool is kept under nitrogen, stored for a minimum period (preferably at 4 C or room temperature), and centrifuged at 40,000 x *g*.

0195 LOSS OF COLONIC HAUSTRATION IN PROGRESSIVE SYSTEMIC SCLEROSIS. (Eng.)

Martel, W.; Chang, S. F.; Abell, M. R. (Univ. Michigan Medical Center, Ann Arbor, MI 48104). *Am. J. Roentgenol.* 126(4):704-713; 1976.

Roentgenologic and microscopic findings in the colon of 20 patients are reported to investigate the association between loss of colonic haustration and systemic sclerosis. The cases were classified into four groups according to the predominant roentgenologic abnormality: ahaustral, relatively ahaustral, sacculation (characteristic of scleroderma), or normal. Of the 20 patients, 6 had severe loss of colonic haustration on barium enema examination, 12 had varying degrees of haustration loss or colonic sacculation, and 2 had no colonic abnormality. An increase in colonic length was characteristic and occasionally, there was slight to moderate generalized dilatation. Loss of haustration was most obvious roentgenologically in the transverse and descending portions of the colon. In the eight patients in whom necropsy was performed, the only consistent histologic findings were atrophy and fibrosis of the muscularis propria. These were patchy, variable in severity, and involved both muscular coats. The authors suggest that muscular atrophy and fibrous replacement, characteristics of systemic sclerosis, may cause colonic lengthening and loss of haustration. It is stressed that this appearance must not be confused with other conditions, particularly chronic ulcerative colitis.

0196 COLONOSCOPY WITHOUT FLUOROSCOPY [Abstract]. (Eng.)

Waye, J. D. (Mount Sinai Sch. Medicine, New York, NY). *Gastrointest. Endosc.* 21(4):198; 1975.

0197 INTERNAL STIFFENER AS AN AID TO COLOSCOPY WITH THE ACMI F9A COLOSCOPE [Abstract]. (Eng.)

Rogers, B. H. G. (Grant Hosp., Chicago, IL). *Gastrointest. Endosc.* 21(4):195; 1975.

0198 BIOPSY APPLICATIONS OF A LARGE CHANNEL ENDOSCOPE [Abstract]. (Eng.)

Vennes, J. A.; Silvis, S. E.; Onstad, G. (Univ. Minnesota, Minneapolis, MN). *Gastrointest. Endosc.* 21(4):197; 1975.

0199 INSTANT ENDO-PHOTOGRAPHY: A NEW CAMERA [Abstract]. (Eng.) Waye, J. D. (Mount Sinai Sch. Medicine, New York, NY). *Gastrointest. Endosc.* 21(4):198; 1975.

0200 POLAROID ENDOSCOPIC PHOTOGRAPHY [Abstract]. (Eng.) Nebel, O. T. (Naval Regional Medical Center, San Diego, CA). *Gastrointest. Endosc.* 21(4):192; 1975.

0201 COMPARISON OF ENDOSCOPY AND UPPER GI SERIES IN DIAGNOSTIC ACCURACY AND THERAPY IN ACUTE UPPPER GASTROINTESTINAL HEMORRHAGE [Abstract]. (Eng.) Keller, R. T.; Logan, G. M., Jr. (Cleveland Veterans Admin. Hosp., Cleveland, OH). *Gastrointest. Endosc.* 21(4):190; 1975.

0202 A NEW PROTOTYPE TWO-CHANNEL UPPER GASTROINTESTINAL OPERATING FIBERSCOPE [Abstract]. (Eng.) Gaisford, W. D. (Latter-day Saints Hosp., Salt Lake City, UT). *Gastrointest. Endosc.* 21(4):188; 1975.

0203 A NEW TECHNIQUE FOR SPHINCTER PRESSURE MEASUREMENT [Abstract]. (Eng.) Dent, J. (Prince Henry's Hosp., Melbourne, Victoria, Australia). *Aust. N.Z. J. Med.* 5(4):396; 1975.

0204 NEW TRIAL FOR ENDOSCOPICAL OBSERVATION OF ESOPHAGUS BY DYE SCATTERING METHOD. (Eng.) Toriie, S.; Kohli, Y.; Akasaka, Y.; Kawai, K. (Kyoto Prefectural Univ. Medicine, Kawaramayi-Hirokoj, Kyoto, Japan). *Endoscopy* 7(2):75-79; 1975.

0205 COMPUTER ANALYSIS OF BOWEL SOUNDS. (Eng.) Dalle, D.; Devroede, G. (Centre Hospitalier Univ., Sherbrooke, Quebec, Canada). *Comput. Biol. Med.* 4(3-4):247-256; 1975.

0206 INTRAVENOUS CHOLECYSTOCHOLANGIOGRAPHY IN THE DIAGNOSIS OF ACUTE CHOLECYSTITIS. (Spa.) Savio, O. S.; Gonzalez, B. N.; Baez, A. A.; Kim, L. C.; Morejon, H. M. (Hospital Clinicoquirurgico "Joaquin Albarran," Ave. 26 y Boyeros, Cerro, Habana, Cuba). *Rev. Cubana Cir.* 14(1):55-59; 1975.

0207 THE VALUE OF THE INTRAVENOUS GALACTOSE TOLERANCE TEST AND SERUM VITAMIN B_{12} LEVEL IN THE DIFFERENTIAL DIAGNOSIS AND PROGNOSIS OF LIVER DISEASE. (Dan.) Hugod, C.; Gade, S.; Krasilnikoff, A.; Østergaard Kristensen, H. P. (Centralsygehuset, Slagelse, medicinsk afdeling og central-laboratoriet., Copenhagen, Denmark). *Ugeskr. Laeger* 137(3):141-145; 1975.

0208 A FALSE POSITIVE HEPATIC FILLING DEFECT RESULTING FROM A SPLENIC CYST. (Eng.) Hall, R. J. C.; Gwilt, D. (St. Thomas' Hosp., London SE 1, England). *Br. J. Radiol.* 48(570):499-500; 1975.

0209 DIAGNOSIS OF GASTRIC CANCER. (Eng.) Segal, A. W.; Healy, M. J. R.; Cox, A. G.; Williams, I.; Slavin, G.; Smithies, A.; Levi, A. J. (Northwick Park Hosp., Watford Road, Harrow, Middlesex HA1 3UJ, England). *Br. Med. J.* 2(5972):669-672; 1975.

0210 CARCINOEMBRYONIC ANTIGEN IN DIFFERENTIAL DIAGNOSIS OF CARCINOMA OF PANCREAS FROM CHRONIC PANCREATITIS. (Eng.) Dilawari, J. B.; Philippakos, D.; Blendis, L. M.; Waller, S. L. (Central Middlesex Hosp., London NW 10, England). *Br. Med. J.* 2(5972):668; 1975.

0211 EXPERIMENTAL OPTIMIZATION OF THE DASS SYSTEM FOR IMMUNODIAGNOSIS OF SOME HELMINTH INFECTIONS. (Eng.) Deelder, A. M.; Snoijink, J. J.; Ploem, J. S. (Lab. Parasitology, Leiden, Netherlands). *Ann. N.Y. Acad. Sci.* 254:119-136; 1975.

0212 APPLICATION OF IMMUNOENZYME METHODS IN DIAGNOSIS OF HUMAN PARASITIC DISEASES [Abstract]. (Eng.) Capron, A.; Dugimont, J. C.; Fruit, J.; Bout, D. (Dept. Immunology, Pasteur Inst., Lille, France). *Ann. N.Y. Acad. Sci.* 254:331; 1975.

0213 A CASE OF GASTRIC LEIOMYOBLASTOMA DIAGNOSED PREOPERATIVELY BY ELECTROCOAGULATION BIOPSY. (Eng.) Yoshida, T.; Fujimoto, K.; Sakaguchi, M.; Fuchigami, T.; Tanaka, K.; Watanabe, H. (Medical Coll., Miyazaki City 889-21, Japan). *Endoscopy* 7(2):101-105; 1975.

0214 ENDOSCOPIC DIAGNOSIS OF EARLY PRIMARY ADENOCARCINOMA IN BARRETT'S COLUMNAR-LINED ESOPHAGUS. (Eng.) Dupas, J. L.; Capron, J. P.; Lorriaux, A. (Centre Hospitalier Univ., Place Victor Pauchet, F-80080 Amiens, France). *Endoscopy* 7(2):98-101; 1975.

0215 LAPAROSCOPY IN EUROPE--RESULTS OF A QUESTIONNAIRE. (Eng.) Lindner, H. (German Red. Cross Hosp., 2000 Hamburg 13, Beim Schlump 84, Germany). *Endoscopy* 7(2):53-58; 1975.

0216 SOME ENDOSCOPIC AND RADIOLOGICAL FEATURES IN GASTRECTOMIZED PATIENTS. (Ita.) Tassini, T.; Da Broi, G. L.; Martinelli, A. (Ospedale Generale Regionale, Udine, Italy). *Quad. Radiol.* 39(1-2-3):257-265; 1974.

0217 FIBER ENDOSCOPY OF THE DUODENUM. (Cze.) Fric, P.; Kotrlik, J.; Ronsky, R. (Faculty General Medicine, Charles Univ., 121 11 Praha 2, Karlovo nam. 32, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 29(2):99-106; 1975.

0218 FOLIC ACID AND VITAMIN B_{12} DETERMINATION IN FETAL LIVER. (Eng.) Vaz Pinto, A.; Torras, V.; Figueroa Sandoval, J. F.; Dillmann, E.;

Ramirez Muteos, C.; Cordova, M. S. (Instituto Nacional de le Nutricion, Mexico City, Mexico). *Am. J. Clin. Nutr.* 28(10):1085-1086; 1975.

0219 SERUM CALCIUM RESPONSES TO EXOGENOUS SECRETIN. (Eng.) Bradley, E. L., III; Wenger, J.; Smith, R. B., III; Galambos, J. T. (Emory Univ. Sch. Medicine, 69 Butler Street SE, Atlanta, GA 30303). *Arch. Surg.* 110(10):1221-1223; 1975.

0220 ECHOGRAPHY IN RADIOLOGICAL DIAGNOSIS OF BILIARY DISEASES. (Pol.) Bryc, S.; Gonciarz, Z. (Acad. Medicine 20-081 Lublin, ul. Staszica 16, Poland). *Pol. Przegl. Radiol.* 39(1):53-58; 1975.

0221 THE VALUE OF HEPATIC SCINTIANGIOGRAPHY AND STATIC LIVER SCANS IN SUPERIOR VENA CAVAL OBSTRUCTION: CASE REPORT. (Eng.) Hughes, F. A., III. (General Hosp., 1060 First Colonial Rd., Virginia Beach, VA 23454). *J. Nucl. Med.* 16(7):626-628; 1975.

0222 CONTRIBUTION OF FIBROSCOPY TO PEDIATRIC GASTROENTEROLOGY. (Fre.) Mougenot, J. F.; Polonovski, C. (Hopital Trousseau, 28, avenue du Dr. Arnold-Netter, 75571, Paris, France). *Pediatre* 11(50):7-18; 1975.

0223 DIAGNOSTIC VALUE OF URINARY AMYLASE IN PATIENTS WITH PANCREATIC CARCINOMA. (Eng.) Furusawa, T.; Hisatsugu, T.; Matsui, K.; Nishimura, M. (First Dept. Surgery, Kyushu Univ., Fukuoka, Japan). *Fukuoka Acta Med.* 65(5):266-270; 1974.

0224 AGGRESSIVE DIAGNOSTIC APPROACH TO UPPER GASTROINTESTINAL HEMORRHAGE. (Eng.) Werbitt, W. (Medical Coll. Pennsylvania, Philadelphia, PA). *J. Med. Soc. N.J.* 72(7):589-594; 1975.

0225 NUCLEAR MEDICINE STUDIES IN THE DIAGNOSIS OF DISEASES OF THE LIVER, PANCREAS, AND SPLEEN. (Eng.) Gumerman, L. W. (Presbyterian-Univ. Hosp., Pittsburgh, PA 15261). *Surg. Clin. North Am.* 55(2):427-447; 1975.

0226 THE DOUBLE CONTRAST METHOD: THE BEST TECHNIQUE FOR RADIOLOGICAL EXAMINATION OF THE STOMACH. (Ger.) Treichel, J.; Oeser, H. (Klinikum Steglitz, Freien Universitat, 1 Berlin 45, Hindenburgdamm 30, Germany). *Dtsch. Med. Wochenschr.* 100(43):2226-2229; 1975.

0227 SERUM AND URINARY ENZYME ACTIVITY IN PANCREATIC AND BILIARY DISEASES. (Rus.) Toskin, K. D.; Kolesnikov, Iu. N.; Spitsyn, I. F.; Kovalenko, V. V. (Crimean Medical Inst., Simferopol, USSR). *Klin. Med. (Mosk.)* 53(6):108-112; 1975.

0228 GASTROINTESTINAL MOTILITY AND TRANSIT IN PATIENTS BEFORE AND AFTER RECONSTRUCTIVE GASTRIC SURGERY. (Rus.) Maksumov, D. N.; Khodzhimetov, A. K.; Shakirov, E. A. (All-Union Research Inst. Clinical Experimental Surgery, Moscow, USSR). *Klin. Med. (Mosk.)* 53(6):85-89; 1975.

0229 CONTROLLED STUDIES ON PREMEDICATION FOR ENDOSCOPY OF THE UPPER GASTROINTESTINAL TRACT. (Ger.) Peter, P.; Bron, B.; Krejs, G. J.; Pelloni, S.; Blum, A. L. (Stadtspital Triemli, Birmendorferstrasse 497, CH-8063 Zurich, Switzerland). *Z. Gastroenterol.* 8(5):520; 1975.

0230 STUDY OF THE HEART RATE, SKIN RESISTANCE, ELECTRODERMAL REACTIONS, AND ELECTROMYOGRAM OF THE CERVICAL MUSCLES DURING FIBER ENDOSCOPIC EXAMINATION OF THE UPPER GASTROINTESTINAL TRACT: RESULTS FROM 13 PATIENTS. (Fre.) Housset, P.; Courtoux, C.; Debray, C. (Hopital Bichat, 170 Bd Ney, F75018 Paris, France). *Z. Gastroenterol.* 8(5):528; 1975.

0231 ENDOSCOPIC DIAGNOSIS OF SPONTANEOUS INTERNAL FISTULAS. (Ger.) Rosch, W.; Schaffner, O.; Fruhmorgen, P.; Koch, H. (Med. Univ.-Klinik, D-852 Erlangen, Krankenhausstrasse 12, Germany). *Z. Gastroenterol.* 8(5):537-538; 1975.

0232 A SIMPLE CLINICAL METHOD FOR MEASUREMENT OF GASTRIC EMPTYING OF SOLID MEALS [Abstract]. (Eng.) Ostick, D. G.; Green, G.; Howe, K.; Dymock, I. W.; Cowley, D. J. (Univ. Hosp. South Manchester, Manchester, England). *Br. J. Surg.* 62(8):663; 1975.

See also, 0233, 0247, 0275, 0297, 0324, 0338, 0380, 0388, 0389, 0410, 0413, 0437, 0454, 0478, 0482, 0505, 0516, 0540, 0624, 0627, 0628, 0629, 0630, 0676, 0678, 0743, 0750, 0756, 0767.

GASTROINTESTINAL DISEASES

ESOPHAGUS

0233 THE COLUMNAR EPITHELIAL-LINED LOWER ESOPHAGUS AND ITS ASSOCIATION WITH ADENOCARCINOMA OF THE ESOPHAGUS. (Eng.) Cho, K. J.; Hunter, T. B.; Whitehouse, W. M. (Wayne County General Hosp., Eloise, MI 48132). *Radiology* 115(3):563-568; 1975.

The case reports of four patients with columnar epithelial-lined lower esophagus are presented. The condition was complicated by esophagitis (one patient, an 18-yr-old man with cystic fibrosis), ulceration (one patient, a 54-yr-old woman with esophageal adenocarcinoma), perforation (one patient, a 31-yr-old man), and adenocarcinoma of the esophagus (two patients, the 54-yr-old and a 62-yr-old woman). When the squamocolumnar junction was involved by peptic esophagitis, the area of mucosal transition appeared as a tapered, strictured segment or a ring-like constriction some distance proximal to the muscular esophagogastric junction. Hiatal incompetence with massive gastroesophageal reflux was evident in one case. A deep penetrating ulcer may occur anywhere along the columnar epithelium, identical to peptic gastric ulceration. The columnar-lined lower esophagus should probably be considered a premalignant condition.

0234 COLUMNAR-LINED LOWER ESOPHAGUS: AN ACQUIRED LESION WITH MALIGNANT PREDISPOSITION. REPORT ON 140 CASES OF BARRETT'S ESOPHAGUS WITH 12 ADENOCARCINOMAS. (Eng.) Naef, A. P.; Savary, M.; Ozello, L. (Yverdon Hosp., 1400 Yverdon, Switzerland). *J. Thorac. Cardiovasc. Surg.* 70(5):826-835; 1975.

Findings on 140 cases of extensive columnar metaplasia of the distal esophagus, 12 of whom had esophageal adenocarcinomas, are reported in an analysis of 1225 cases of reflux esophagitis. All cases of columnar metaplasia were studied by endoscopy, photography, and histologic examination. The columnar heterotropic epithelium tended to ascend from the cardia into the distal esophagus. Photographs demonstrated that peptic ulcerations of the squamous epithelium were progressively replaced by columnar metaplasia during the healing phase of peptic esophagitis. The 12 adenocarcinomas represented an unusually frequent association with extensive columnar metaplasias, suggesting a causal relation between the two pathological conditions. Clinical, endoscopic, and pathological follow-ups for at least 5 yr after fundoplication established that in the postoperative absence of irritating reflux, the topographic distribution of heterotopic columnar epithelium remained unchanged. The most important discovery was that of the possible malignant transformation of heterotopic columnar epithelium into an adenocarcinoma in spite of an efficient antireflux operation, and thus, complete absence of active esophagitis. The authors suggest that repeated esophagoscopic controls and biopsies are an absolute necessity in all cases of extensive columnar metaplasia, even after cure of active reflux esophagitis by fundoplication.

0235 GASTRIC ACID SECRETION AND LOWER-ESOPHAGEAL-SPHINCTER PRESSURE IN RESPONSE TO COFFEE AND CAFFEINE. (Eng.) Cohen, S.; Booth, G. H., Jr. (Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *N. Engl. J. Med.* 293(18):897-899; 1975.

The dose-response relations of caffeine, regular coffee, and decaffeinated coffee were compared for gastric acid secretion and sphincter pressure in eight normal subjects (21-36 yr-old). Decaffeinated coffee gave a maximal acid response of 16.5 ± 2.6 mEq/hr that was similar to that of regular coffee, 20.9 ± 3.6 mEq/hr, both values being higher than that of caffeine, 8.4 ± 1.3, on a cup-equivalent basis. Sphincter pressure showed minimal changes in response to caffeine, but was significantly increased by both regular and decaffeinated coffee ($p < 0.05$). These data suggest that both regular and decaffeinated coffee are more potent stimulants of gastric acid secretion than caffeine and that clinical recommendations based upon the known gastrointestinal effects of caffeine may bear little relation to the actual observed actions of coffee or decaffeinated coffee.

0236 ESOPHAGOPLASTY WITH FREEZE-DRIED DURA MATTER: EXPERIMENTS ON YOUNG DOGS. (Fre.) Mattes, P.; Herfarth, C.; Schadel, G.; Schreer, I.; Maier, H. (Clinique Chirurgicale, Univ. Ulm, Ulm, Germany). *Bull. Soc. Int. Chir.* 33(5-6):462-469; 1974.

0237 CLINICAL TRIAL OF FROZEN ANTACID SUSPENSIONS IN DISEASES OF THE ESOPHAGUS, STOMACH, AND DUODENUM. (Fre.) Ben Bouali, A.; Joubaud, F. (Clinique Medicale A, C.H.U., 49 Angers, France). *Med. Chir. Dig.* 4(2):127-131; 1975.

0238 RESPIRATORY FUNCTION AFTER OESOPHAGEAL RESECTION [Abstract]. (Eng.) Black, J.; Kalloor, G. J.; Collis, J. L. (Queen Elizabeth Hosp., Birmingham, England). *Br. J. Surg.* 62(8):656-657; 1975.

0239 THE MANAGEMENT OF PEPTIC OESOPHAGEAL STRICTURE. (Eng.) Williamson, R. C. N. (United Bristol Hosp., Reading, England). *Br. J. Surg.* 62 (6):448-454; 1975.

0240 CARCINOMA OF THE OESOPHAGUS WITH "SWALLOW SYNCOPE." (Eng.) Tomlinson, I. W.; Fox, K. M. (Kingston General Hosp., Hull HU3 1UR, England). *Br. Med. J.* 2(5966):315-316; 1975.

0241 MODERN ELEMENTS IN ENDOSCOPIC DIAGNOSIS OF THORACIC CANCER OF THE ESOPHAGUS. (Fre.) Crespon, B.; Housset, P.; Debray, Ch. (Hopital Bichat, 170, bd. Ney, 75877 Paris CEDEX 18, France). *Ann. Gastroenterol. Hepatol.* 11(1):45-50; 1975.

0242 ELEMENTS OF PATHOLOGICAL DIAGNOSIS OF CANCER OF THE ESOPHAGUS. (Fre.) Marche, C.; Bocquet, L.; Debray, Ch. (Hopital Bichat, 170 bd. Ney, 75877 Paris CEDEX 18, France). *Ann. Gastroenterol. Hepatol.* 11(1):51-60; 1975.

0243 RADIOLOGICAL ASPECTS OF ESOPHAGEAL INTRAMURAL DIVERTICULOSIS. (Ger.) Schwegler, N.; Faust, H. (Kantonsspital, CH-4004 Basel, Switzerland). *Fortschr. Rontgenstr.* 112(2):151-155; 1975. 1975.

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0245 SPONTANEOUS ESOPHAGEAL RUPTURE IN THE NEWBORN. (Eng.) Aaronson, I. A.; Cywes, S.; Louw, J. H. (Red Cross Memorial Children's Hosp., Cape Town, Republic of South Africa). *J. Pediatr. Surg.* 10(4):459-466; 1975.

0246 OCCURRENCE OF BACTEREMIA AFTER ESOPHAGEAL DILATION [Abstract]. (Eng.) Raines, D. R.; Branche, W. C.; Anderson, D. L. (Walter Reed Army Medical Center, Washington, DC). *Gastrointest. Endosc.* 21(4):194; 1975.

0247 ESOPHAGEAL DILATATION WITH OLYMPUS GIF TYPE K FIBERSCOPE [Abstract]. (Eng.) Prusak, Y. (Iowa Lutheran Hosp., IA). *Gastrointest. Endosc.* 21(4):194; 1975.

0248 FIBEROPTIC GUIDED WIRE DILATATION OF BENIGN AND MALIGNANT ESOPHAGEAL STRICTURES [Abstract]. (Eng.) Olsen, H. W.; Lawrence, W. A. (Providence Hosp., Oakland, CA). *Gastrointest. Endosc.* 21(4):193; 1975.

0249 ENDOSCOPIC ESOPHAGEAL BIOPSY USING MULTIPURPOSE BIOPSY TUBE [Abstract]. (Eng.) Mangla, J. C.; Kalra, T. M. (Monroe Community Hosp., Rochester, NY). *Gastrointest. Endosc.* 21(4):192; 1975.

0250 BARRETT'S ESOPHAGUS, SUSPECTING THE DIAGNOSIS ON ENDOSCOPY [Abstract]. (Eng.) Mangla, J. C.; Desbaillets, L. G. (Monroe Community Hosp., Rochester, NY). *Gastrointest. Endosc.* 21(4): 192; 1975.

0251 ENDOSCOPIC PLACEMENT OF ESOPHAGEAL PROSTHESIS [Abstract]. (Eng.) King, J. F. (Timken Mercy Hosp., Canton, OH). *Gastrointest. Endosc.* 21(4):190; 1975.

0252 ENDOSCOPIC SIGNS FOR GASTROESOPHAGEAL REFLUX (GER) OBJECTIVELY EVALUATED [Abstract]. Johnson, L. F.; DeMeester, T. R. (Tripler Army Medical Center, Honolulu, HI). *Gastrointest. Endosc.* 21(4):189; 1975.

0253 CLINICAL, ENDOSCOPIC AND MORPHOLOGIC STUDIES IN FOUR PATIENTS WITH COLUMNAR EPITHELIUM LINING THE DISTAL TWO-THIRDS OF THE ESOPHAGUS [Abstract]. (Eng.) Gibb, S. P.; Mallari, R.; Haggitt, R.; Ellis, F. H. (Lahey Clinic Foundation, Boston, MA). *Gastrointest. Endosc.* 21(4):188; 1975.

0254 ESOPHAGEAL DISEASE ASSOCIATED WITH RHEUMATOID ARTHRITIS AND THERAPEUTIC CONSIDERATIONS [Abstract]. (Eng.) Roth, S. (Phoenix Arthritis Center, Phoenix, AZ). *Mayo Clin. Proc.* 50 (9):533-534; 1975.

0255 THE EFFECT OF FUNDOPLICATION ON THE LOWER ESOPHAGEAL SPHINCTER: MECHANICAL OR PHYSIOLOGIC [Abstract]. (Eng.) Ellis, F. H., Jr.; El-Kurd, M. F. A.; Gibb, S. P. (Lahey Clinic Foundation, Boston, MA). *Mayo Clin. Proc.* 50(9):532-533; 1975.

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0257 ROENTGENOLOGICAL CHARACTERISTICS OF ESOPHAGOPLASTY WITH AN ANTIPERISTALTIC TRANSPLANT FROM THE GREATER CURVATURE OF THE STOMACH. (Rus.) Varshavskii, Iu. V.; Mamotov, A. S.; Starchenko, V. A.; Shekhter, Iu. I. (P. A. Gertsen Res. Inst. Oncology, Moscow, USSR). *Vestn. Rentgenol. Radiol.* (2):45-50; 1975.

0258 ESOPHAGEAL ATRESIA WITH A LARGE GAP BETWEEN THE ESOPHAGEAL SEGMENTS. (Ger.) Hofmann, S. (Chirurg. Univ.-Klinik Mainz, Kinderchirurgie, 65 Mainz, Langenbeckstrasse 1, Germany). *Z. Kinderchir. Grenzgeb.* 16(1):91-93; 1975.

0259 TRAUMA TO THE ESOPHAGUS. (Eng.) Loop, F. D. (Cleveland Clinic, Cleveland, OH). *Cleve. Clin. Q.* 42(2):175-185; 1975.

0260 SELECTION OF PATIENTS AND OPERATIONS FOR BLEEDING ESOPHAGEAL VARICES. (Eng.) Cooperman, A. M. (Cleveland Clinic, Cleveland, OH). *Cleve. Clin. Q.* 42(2):187-192; 1975.

0261 TUBERCULOUS ULCER OF THE ESOPHAGUS. (Fre.) De Witte, C.; Dony, A.; Serste, J.-P. (Rue Jacques Raye 46, B-1030 Bruxelles, Belgium). *Acta Gastroenterol. Belg.* 38(3-4):156-163; 1975.

0262 ENDOSCOPIC CLOSURE OF RECURRENT ESOPHAGOTRACHEAL FISTULAS WITH A SURGICAL ADHESIVE FOLLOWING ESOPHAGEAL ATRESIA. (Ger.) Waag, K. L.; Joppich, I.; Manegold, B. C. (Klinikum Mannheim, Universitat Heidelberg, 68 Mannheim 1, Theodor Kutzer-Ufer, Germany). *Z. Kinderchir. Grenzgeb.* 17(1):24-28; 1975.

0263 OESOPHAGEAL CANCER IN CHINA. (Eng.) Anonymous. (No affiliation given). *Br. Med. J.* 3(5975):61; 1975.

See also, 0202, 0204, 0214, 0277, 0325, 0453, 0615.

STOMACH

0264 DISTRIBUTION OF PARIETAL CELLS IN THE ANTRAL MUCOSA OF HUMAN STOMACHS. (Eng.) Tominaga, K. (Tokyo Metropolitan Komagome Hosp., 3-18-22, Honkomagome, Bunkyo-ku, Tokyo, Japan). *Gastroenterology* 69(6):1201-1207; 1975.

The distribution of parietal cells in the antral mucosa was examined in 118 stomachs obtained at necropsy from 72 men and 46 women (all ages) who died from a wide variety of causes, except gastric lesions. The parietal cells appeared in the antrum in 116 cases. The patterns of distribution of parietal cells were divided into four groups. The most frequent pattern (76.3%) was that in which the parietal cells were distributed in all regions of the antrum including just proximal to the gastroduodenal junction. Parietal cells were found most frequently in the area just proximal to the junction in patients aged 20-40 yr and also at 70 yr of age. In 18 of the 118 stomachs, the focal concentration of the parietal cells near the duodenum was greater than the other part of the antrum, reaching more than 50% of the parietal cells of the average fundic gland. The density increased in slight antral gastritis and decreased in cases with moderate to severe antral gastritis. Clustered parietal cells were present in the proximal part of the duodenum in 27 of 118 cases. As parietal cells were also found in the antrum of stomachs of newborns and infants (< 1 yr of age), their presence could not be attributed to metaplasia or dystopia. Thus, the authors consider the parietal cells in the antrum a usual cell component of the pyloric gland.

0265 THE PREVALENCE OF GASTRIC AUTOANTIBODIES IN CHRONIC ALCOHOLICS. (Eng.) Pitchumoni, C. S.; Lopes, J. D.; Glass, G. B. J. (Metropolitan Hosp. Center, 1901 First Ave., New York, NY 10029). *Am. J. Gastroenterol.* 64(3):187-190; 1975.

Alcoholic men and women (150) and nonalcoholic controls (150, age and sex-matched) were evaluated for the presence of parietal cell antibodies (PCA). Blocking and binding intrinsic factor antibodies (IFA) were determined in the PCA-positive sera. The prevalence and age and sex distribution of PCA in the alcoholics and nonalcoholics were identical. In alcoholics over the age of 60 yr, the incidence of PCA although higher than in those of the younger age groups was similar to that in the nonalcoholics of the same age group (in men, 6.3% and 7.3% and in women, 7.5% and 10.0%, resp.). Antral gastritis of moderate or severe degree was the frequent lesion in alcoholics. This form of gastritis was not associated with any significant increase in the incidence of PCA. No patients with sera positive for IFA were detected among the 22 PCA-positive patients. There is no evidence for humoral derangement of the gastric autoimmunity in chronic alcoholics.

0266 GASTRIN LEVELS AFTER PROXIMAL GASTRIC VAGOTOMY. (Eng.) Hayes, J. R.; Ardill, J.; Kennedy, T. L.; Buchanan, K. D. (Royal Victoria Hosp., Belfast, Ireland). *Ir. J. Med. Sci.* 144(9):349-354; 1975.

Fasting gastrin levels were compared in 16 patients before and after selective vagotomy with drainage and in 15 patients before and after proximal gastric vagotomy without drainage. In addition, the gastrin response to ingested protein after proximal gastric vagotomy was studied. In both groups there was a significant rise in fasting gastrin levels (45-85 pg/ml and 70-84 pg/ml, resp.) following the operative procedures, but no significant difference between gastrin levels after selective vagotomy and after proximal gastric vagotomy was found. The gastrin output in response to protein in six patients with proximal gastric vagotomy studied within 2 weeks of operation did not differ from their pre-operative response. The results demonstrate that the retention of an innervated antrum as in proximal gastric vagotomy neither resulted in fasting gastrin levels that were higher than when the antrum was denervated nor in excessive gastrin levels after protein ingestion. In both postoperative groups, insulin hypoglycemia produced a similar rise in gastrin levels: 60-98 pg/ml in patients with selective vagotomy and 55-84 pg/ml in patients with proximal gastric vagotomy. Insulin hypoglycemia is therefore not a specific test of vagal function, and other mechanisms may be involved in the increase in acid secretion seen after insulin.

0267 NUTRITIONAL CONSEQUENCES OF TOTAL GASTRECTOMY. (Eng.) Bradley, E. L., III; Isaacs, J.; Hersh, T.; Davidson, E. D. (Emory Univ. Sch. Medicine, 69 Butler St., Atlanta, GA). *Ann. Surg.* 182(4):415-429; 1975.

The ability to ingest and absorb adequate amounts of nutrients was investigated in 10 patients (7 men and 3 women) who had undergone total gastrectomy without evidence of malignancy. Metabolic balance studies were also performed to discover how effectively these patients could accumulate and use the absorbed nutrients. In the controlled hospital situation, the amount of food ingested was greater than the amount required for maintenance of ideal body weight. Although mild malabsorption of fat and nitrogen was documented, weight gain and positive nitrogen balance occurred. In direct contrast, food intake significantly decreased when the patients returned to their home environment. While severe malabsorption may contribute to malnutrition in the individual patient, the most common mechanism responsible for postoperative malnutrition was inadequate intake. Construction of a Hunt-Lawrence jejunal pouch was not found to favorably affect caloric intake, weight gain, degree of malabsorption, or dumping symptoms. The results indicate that although some degree of malnutrition does result from total gastric resection, in most cases it is mild and potentially correctable.

0268 INTRAGASTRIC MICROBIAL COLONIZATION IN COMMON DISEASE STATES OF THE STOMACH AND DUODENUM. (Eng.) Nichols, R. L.; Smith, J. W. (Veterans Admin. Hosp., Downey, IL 60064). *Ann. Surg.* 182(5):557-561; 1975.

Patients (49) undergoing elective or emergent gastric surgery were examined for the presence of gastric microflora, and the role of this microflora in postoperative wound infection was studied. Gastric needle aspiration was performed at the time of surgery in each case, followed by qualitative aerobic and anaerobic bacteriologic analysis. Isolation of intragastric aerobes and/or anaerobes was possible in 32/49 patients. In 18 patients undergoing elective operation for chronic nonobstructing doudenal ulcer, a gastric microflora was present in only three patients and no postoperative wound infections were observed. In 29 of 31 patients, in other groups of patients with bleeding or obstructing duodenal ulcer, or in those with gastric ulcer or malignancy, intragastric microorganisms were present. Six of the seven postoperative wound infections that developed in these groups of patients were due to one of the same bacteria isolated at the time of original needle aspiration. The authors conclude that the endogenous intragastric microflora is a significant factor in the development of postoperative wound sepsis following gastric resection in those groups of patients with a compromise of their normal gastric antibacterial inhibitory mechanisms.

0269 EFFECTS OF GASTRIC SURGERY ON DIFFERENTIAL EMPTYING OF SOLID AND LIQUID COMPONENTS OF THE GASTRIC CONTENTS [Abstract]. (Eng.) Heading, R. C.; Tothill, P.; McLoughlin, G. P.; Shearman, D. J. C. (Dept. Therapeutics, Univ. Edinburgh, Edinburgh, Scotland). *Br. J. Surg.* 62(8):659; 1975.

0270 GASTRIC TUMORS OF MUSCULAR ORIGIN. (Spa.) Juan Burgueno, M.; Carbonell Tatay, F.; Rivas Rodero, S.; Sendra Leon, P.; Munoz Ibanez, M.; Gomez Yague, E.; Mir Pallardo, J. (Ciudad Sanitaria "La Fe," Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 46(3):271-284; 1975.

0271 PLASMA GASTRIN AFTER PROXIMAL GASTRIC VAGOTOMY AND VAGOTOMY AND ANTRECTOMY [Abstract]. (Eng.) Royston, C. M. S.; Cooke, W. M.; Russell, R. C. G.; Bloom, S. R.; Spencer, J. (Royal Postgraduate Medical Sch., London, England). *Br. J. Surg.* 62(8):664; 1975.

0272 SPLENOPORTOGRAPHY IN CARCINOMA OF THE RESECTED STOMACH. (Rus.) Roshchektaev, N. V. (Alma-Ata Inst. Postgraduate Medicine, USSR). *Vestn. Rentgenol. Radiol.* (2):26-32; 1975.

0273 CHRONIC HYPERTROPHIC GLANDULAR GASTRITIS AND CANCER OF THE STOMACH. (Rus.) Tishchenko, M. A.; Butov, Iu. L. (Ukrainian Inst. Postgraduate Medicine, Kharkov, USSR). *Arkh. Patol.* 37 (4):23-29; 1975.

0274 EFFECT OF THE HISTAMINE H_2 RECEPTOR ANTAGONIST, CIMETIDINE, ON INSULIN-INDUCED GASTRIC SECRETION IN MAN [Abstract]. (Eng.) Carter, D. C.; Logan, R.; Forrest, J. A. H.; Ansell, I.; Heading, R. C.; Sherrman, D. J. C. (Dept. Clinical Surgery, Edinburgh Univ., Edinburgh, Scotland). *Br. J. Surg.* 62(8):664; 1975.

0275 VALUE OF PERIOPERATIVE ACID TESTS IN PREDICTING RECURRENT ULCERATION AFTER VAGOTOMY [Abstract]. (Eng.) Hood, J. M.; Spencer, E. F. A.; Macrae, K. D.; Kennedy, T. (Royal Victoria Hosp., Belfast, Ireland). *Br. J. Surg.* 62(8):665; 1975.

0276 THE PREVALENCE OF CHRONIC GASTRITIS IN PATIENTS WITH GASTRIC ULCER. (Eng.) Fung, W. P.; Lee, S. K.; Tye, C. Y. (Dept. Medicine, Univ. Singapore, Singapore 3). *Aust. N.Z. J. Med.* 5(2): 133-137; 1975.

0277 STUDIES OF THE MOTOR FUNCTION OF THE PHARYNX, ESOPHAGUS AND STOMACH BY BALLOON KYMOGRAPHY IN PATIENTS WITH GENERALIZED MYASTHENIA BEFORE AND AFTER THYMECTOMY. (Rus.) Shirkova, K. I.; Smakov, G. M.; Chistova, S. V.; Stepenko, A. S. (1st Moscow Medical Inst., Moscow, USSR). *Ter. Arkh.* 46 (3):80-87; 1974.

0278 CARCINOMA OF STOMACH--A STUDY OF 200 CASES. (Eng.) Sivanagamani, K.; Reddy, D. B.; Raju, G. C. (Kurnool Medical Coll., Kurnool-A.P., India). *Indian J. Cancer* 11(4):437-443; 1974.

0279 BILE REFLUX GASTRITIS: EXPERIMENTAL OBSERVATIONS AND RESULTS OF THERAPY WITH CHOLESTYRAMINE OR ROUX-EN-Y GASTROENTEROSTOMY [Abstract]. (Eng.) Scudamore, H. H.; Eckstam, E. E. (Monroe Clinic, Monroe, WI). *Gastrointest. Endosc.* 21(4):196; 1975.

0280 ENDOSCOPIC OBSERVATION OF POLYPOID GASTRITIS [Abstract]. (Eng.) Sipzener, R. S.; Kleinman, M. S.; Schenk, E. A. (Univ. Rochester Medical School, Rochester, NY). *Gastrointest. Endosc.* 21(4):196; 1975.

0281 APPLICATION OF FIBEROPTIC-COUPLED ARGON LASER IN THE CONTROL OF EXPERIMENTALLY PRODUCED GASTRIC BLEEDING [Abstract]. (Eng.) Waitman, A. M.; Spira, I.; Chryssanthou, C. P.; Stenger, R. J. (Beth Israel Medical Center, New York, NY). *Gastrointest. Endosc.* 21(4):197; 1975.

0282 EXPERIMENTAL ELECTROCOAGULATION OF DOG GASTRIC MUCOSA [Abstract]. (Eng.) Papp, J. P.; Fox, J. M.; Wilks, H. S. (Blodgett Memorial Hosp., Grand Rapids, MI). *Gastrointest. Endosc.* 21(4):194; 1975.

0283 GASTRIC ANTRAL MUCOSAL DIAPHRAGM IN ADULTS [Abstract]. (Eng.) Kurlander, D. J.; Katz, J. B.; Lubert, M.; Abellera, R. M. (Mt. Sinai Hosp., Cleveland OH). *Gastrointest. Endosc.* 21(4):191; 1975.

0284 INCIDENCE OF GASTRIC CARCINOMA [Abstract]. (Eng.) King, J. F. (Timken Mercy Hosp., Canton, OH). *Gastrointest. Endosc.* 21(4):191; 1975.

0285 ENDOSCOPIC FULL THICKNESS MUCOSAL BIOPSY IN ASYMPTOMATIC CHRONIC HYPERPLASTIC GASTROPATHY [Abstract]. (Eng.) Kawanishi, H. (Ann Arbor Veterans Admin. Hosp., Ann Arbor, MI). *(Gastrointest. Endosc.* 21(4):190; 1975.

0286 BILE REFLUX GASTRITIS: VALUE OF ENDOSCOPIC CRITERIA [Abstract]. (Eng.) Goldner, F.; Boyce, H. W., Jr. (Walter Reed Army Medical Center, Washington, DC). *Gastrointest. Endosc.* 21(4):189; 1975.

0287 A SEVEN YEAR FOLLOW-UP STUDY ON CARCINOMA OF THE STOMACH DIAGNOSED BY ENDOSCOPY [Abstract]. (Eng.) Gibb, S. P. Saxena, R.; Cady, B. (Lahey Clinic Foundation, Boston, MA). *Gastrointest. Endosc.* 21(4):188; 1975.

0288 PERITONEOSCOPIC DIAGNOSIS OF THE CAUSE OF ASCITES [Abstract]. (Eng.) Fierst, S. M.; Gupte, U.; Agostino, S.; Hashemiyoon, A. (Brooklyn-Cumberland Medical Center, Brooklyn, NY). *Gastrointest. Endosc.* 21(4):187; 1975.

0289 MECHANISM OF STRESS ULCER: INFLUENCE OF HYPOVOLEMIC SHOCK ON ENERGY METABOLISM IN THE GASTRIC MUSOCA [Abstract]. (Eng.) Menguy, R.; Masters, Y. F. (Genesee Hosp., 224 Alexander St., Rochester, NY 14607). *Digestion* 10(3):233; 1974.

0290 EFFECT OF POSTURE ON GASTRIC EMPTYING OF SOLID MEALS [Abstract]. (Eng.) Gowley, D. J.; Mancock, B. D.; Bowen-Jones, E.; Dixon, R.; Tests, T.; Dymock, I. W. (Univ. Hosp. South Manchester, Manchester, England). *Mayo Clin. Proc.* 50(9):534; 1975.

0291 GASTRIC MUCUS AND MUCOSAL INJURY [Abstract]. (Eng.) Glass, G. B. J. (New York Medical Coll., New York, NY). *Mayo Clin. Proc.* 50(9):530-531; 1975.

0292 EARLY GASTRIC CARCINOMA [Abstract]. (Eng.) Rowland, R.; Hecker, R.; Fitch, R. J.; Gibson, G. E.; Willing, R.; Jennings, W. L. (Royal Adelaide Hosp., Adelaide, South Australia). *Aust. N.Z. J. Med.* 5(4):395; 1975.

0293 ARRYTHMIAS [SIC] AND ISCHEMIC CHANGES OF THE HEART INDUCED BY GASTRIC ENDOSCOPIC PROCEDURES. (Eng.) Fujita, R.; Kumura, F. (Tokyo Univ. Branch Hosp., 3-28-6 Mejirodai Bunkyo-Ku, Tokyo, Japan). *Am. J. Gastroenterol.* 64(1):44-48; 1975.

0294 ENDOSCOPIC POLYPECTOMY OF A SYMPTOMATIC ANTRAL POLYP. (Eng.) Vittal, S. E. V. (Alexian Brothers Hosp., 175 N. Jackson Ave., Suite 105, San Jose, CA 95116). *Am. J. Gastroenterol.* 64(1):55-58; 1975.

0295 DIAGNOSIS OF EARLY FORMS OF GASTRIC CANCER USING FLUOROSCOPIC SCREENING. (Rus.) Vintergalter, S. F. (N. N. Petrov Res. Inst. Oncology, Leningrad, USSR). *Vestn. Rentgenol. Radiol.* (2):92-94; 1975.

0296 OSMOLALITY OF THE GASTRIC CONTENTS IN THE MAXIMAL HISTAMINE STIMULATION TEST. (Pol.) Marlicz, K. (Pomeranian Acad. Medicine, 71-307 Szczecin, ul. Mickiewicza 85/3, Poland). *Pol. Arch. Med. Wewn.* 53(4):359-366; 1975.

STOMACH

0297 GASTRIC LESIONS: RADIOLOGICAL, ENDOSCOPIC, AND BIOPSY STUDY. (Fre.) Chatelin, C. -L.; Cristofari, X.; Martin, J. -P.; Rouison, D.; Fissore, A.; Compora, J.-L.; Lasserre, M. (Centre Hospitalier Princesse Grace, Monaco). *Sem. Hop. Paris* 51(23):1548-1553; 1975.

See also, 0083, 0192, 0202, 0209, 0213, 0216, 0226, 0228, 0232, 0235, 0237, 0252, 0253, 0276, 0300, 0301, 0302, 0308, 0316, 0318, 0325, 0328, 0330, 0331, 0359, 0404, 0456, 0467, 0615, 0691, 0693.

STOMACH

Peptic Ulcers

0298 THE DEFINITION OF RADIOLOGICAL SIGNS IN GASTRIC ULCER AND ASSESSMENT OF THEIR VALIDITY BY INTER-OBSERVER VARIATION STUDY. (Eng.) Schulman, A.; Simpkins, K. C. (General Infirmary, Leeds, England). *Clin. Radiol.* 26(3):311-316; 1975.

The reliability of radiological signs in benign and malignant gastric ulcers was evaluated in an inter-observer variation study using two radiologists and the films from 69 barium meal studies. Only four signs were shown to be valid for predicting the probability of malignancy or benignancy in gastric ulcers. These were the projection or nonprojection of the in-profile ulcer, the presence or absence of mucosal folds, good or poor definition of the in-face ulcer's edge, and extension of radiating folds to the in-face ulcer's edge. An insufficient number of cases prevented the analysis of other signs previously thought to have value in distinguishing benign and malignant lesions: qualities of the in-profile ulcer shape, qualities of the in-face ulcer shape, a single nodule in the floor of the in-profile ulcer, and persistent spasm of the pyloric antrum. Signs of poor validity included various qualities of the surrounding filling defect and of the halo, and nodularity of the ulcer rim. The authors conclude that as defined in the literature, the majority of radiological signs in this field are of uncertain existence. However, the four signs found to be valid in this study do not fully describe the important appearances that may be seen in benign and malignant ulcers and are inadequate to obtain a sufficiently high degree of probability.

0299 THE ACCURACY OF RADIOLOGICAL DIAGNOSIS OF BENIGN, PRIMARILY AND SECONDARILY MALIGNANT GASTRIC ULCERS AND THEIR CORRELATION WITH THREE SIMPLIFIED RADIOLOGICAL TYPES. (Eng.) Schulman, A.; Simpkins, K. C. (Leeds General Infirmary, Leeds, England). *Clin. Radiol.* 26(3):317-325; 1975.

The diagnostic accuracy and reliability of 2 radiologists in regard to the benignancy or malignancy of 145 radiographic representations of gastric ulcers, all with gastrectomy histological proof of benignancy or malignancy, were evaluated. A radiological diagnosis of malignancy was 98.6% reliable. A diagnosis of benignancy was less reliable (85.4% true positives), but this was a surgical series containing over one-third malignant ulcers. A correct diagnosis was made in 99.5% of the proven benign ulcers, but in only 68.6% of the proven malignant ulcers. Analysis of the pathology reports on the malignant ulcers showed that it was mainly those arising on the basis of pre-existing benign ulcers (i.e., secondarily malignant ulcers) that were wrongly diagnosed radiologically, thus suggesting that they have a fundamentally different radiographic appearance from that of primarily malignant ulcers. The ulcers could be divided into three simplified radiological types based on their in-profile appearances: type 1 (projecting), type 2 (intraluminal), and type 3 (so shallow as to be neither projecting nor intraluminal). Statistical association with the histological types led to the conclusions that radiological type 2 or 3 ulcers should be diagnosed as almost certainly malignant and that radiological type 1 ulcers are almost always benign but should be followed up until healed because the rare secondarily malignant ulcers are also usually of this type.

0300 THE EFFECT OF INTRAGASTRIC NEUTRALIZATION ON THE GASTRIC ACID RESPONSE TO ANTRAL DISTENSION IN MAN. (Eng.) Bergegardh, S.; Knutson, U.; Olbe, L. (Dept. Surgery II, Sahlgrenska Sjukhuset, Univ. Goteborg, S-413 45 Goteborg, Sweden). *Scand. J. Gastroenterol.* 10(6):625-631; 1975.

The gastric acid secretion in response to graded antral distension was determined in 7 healthy subjects and in 24 peptic ulcer patients (6 with gastric ulcers, 7 with quiescent duodenal ulcers, and 11 with active duodenal ulcers) with water perfusion or alkaline buffer perfusion of the stomach. The resultant intragastric pH was 1.8-3.0 for the controls and 6.2-8.3 for the peptic ulcer patients. Intragastric neutralization increased the basal acid secretion in healthy subjects and gastric ulcer patients but did not change the basal acid secretion in duodenal ulcer patients. Distension of the antrum produced the same secretory effect with and without intragastric neutralization. No increased acid response occurred in healthy subjects. A slight acid response occurred in patients with a quiescent duodenal ulcer or a gastric ulcer, and a more pronounced acid response was seen in patients with an active ulcer, amounting to about 30% of the peak acid response to pentagastrin. The results show that: a) peptic ulcer patients, particularly patients with an active duodenal ulcer, are more sensitive to the acid secretory effect of antral distension than healthy subjects; b) increasing the intragastric pH above 2.0 does not enhance the acid response to antral distension; and c) the acid secretory effect of antral distension is markedly less in man than the effect reported for the dog.

0301 GASTRIC SECRETORY RESPONSE TO GRADED DOSES OF PENTAGASTRIN ALONE OR IN COMBINATION WITH CARBACHOLINE IN UNOPERATED DUODENAL ULCER PATIENTS. (Eng.) Roland, M. (Aker Univ. Hosp., Oslo 5, Norway). *Scand. J. Gastroenterol.* 10(6):603-608; 1975.

The sensitizing effect of carbacholine on pentagastrin-stimulated gastric secretion in six unoperated duodenal ulcer patients was investigated. On different days, pentagastrin was given in doses of 0.15, 1.5, and 15 μg/kg/hr, either alone or in combination with carbacholine (2 μg/kg/hr). There were no significant differences between mean acid or pepsin outputs or mean volumes of gastric juice after infusion of pentagastrin alone or pentagastrin plus carbacholine at any dose step of pentagastrin. The dose of pentagastrin required to elicit half maximal acid output (K_m) and the calculated maximal acid output (V_{max}) were the same for pentagastrin alone and pentagastrin plus carbacholine. The authors conclude that carbacholine did not increase the sensitivity of the parietal cells to pentagastrin in the unoperated duodenal ulcer patients.

0302 A STUDY OF THE RELATIONSHIP BETWEEN SERUM GROUP I PEPSINOGEN LEVELS AND GASTRIC ACID SECRETION. (Eng.) Samloff, I. M.; Secrist, D. M.; Passaro, E., Jr. (Harbor General Hosp., 1000 W. Carson St., Torrance, CA 90509). *Gastroenterology* 69(6):1196-1200; 1975.

Serum group I pepsinogen (PG I) levels, basal acid output, and peak acid output (PAO) were determined in 120 patients, 54 with duodenal ulcer, 14 with prepyloric ulcer, 12 with gastric ulcer, and 40 without ulcer. The correlation between serum PG I and PAO was statistically significant (r=0.736, $p<0.001$) up to a serum PG I level of 250 ng/ml. Serum PG I levels above 250 ng/ml were associated with a plateau in the PAO. Each of eight patients with a serum PG I of less than 40 ng/ml had a PAO of less than 10 mEq/hr. Of 34 patients with a serum PG I over 200 ng/ml, 29 (85.3%) had a PAO of greater than 40 mEq/hr and all had a PAO above 34 mEq/hr. Of 51 patients with a serum PG I between 60 and 150 ng/ml, 47 (92.2%) had a PAO of 10-40 mEq/hr. The results indicate that a significant relation exists between the concentration of PG I in serum and the acid secretory capacity of the gastric mucosa.

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A multicenter endoscopically monitored double-blind trial was undertaken to assess whether metiamide administration would increase the rate of healing of duodenal ulcers as compared to use of a placebo. Of 68 patients with endoscopically confirmed duodenal ulceration, 36 received 1 g or 1.3 g metiamide and 32 placebo daily for 4 weeks. Healing of duodenal ulcers was significantly increased in patients receiving metiamide (67%) compared with those on placebo (25%). There was also an associated significant decrease in daytime pain and antacid consumption in those on metiamide. It is concluded that a histamine H_2-receptor antagonist can promote healing of duodenal ulceration.

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SMALL INTESTINE

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See also, 0051, 0202, 0205, 0217, 0268, 0294, 0311, 0366, 0367, 0370, 0373, 0396, 0404, 0412, 0439, 0458, 0474, 0680, 0738, 0750.

SMALL INTESTINE

Malabsorption

0366 FREE INTRINSIC FACTOR IN THE SMALL INTESTINE IN MAN. (Eng.) Kapadia, C. R.; Mathan, V. I.; Baker, S. J. (Veterans Admin. Hosp., Medical SVC,W. Spring St., West Haven, CT 06516). *Gastroenterology* 70(5):704-706; 1976.

Human jejunal and ileal contents and ileostomy effluents were examined for the presence of free intrinsic factor (IF) to determine if IF in the small intestine is physiologically active. IF was measured either by zirconium phosphate gel and the binding IF antibody, or by hemoglobin-coated charcoal and the blocking IF antibody in jejunal aspirates from six healthy control subjects and four with tropical sprue. IF was detected in 9 of 10 jejunal and 3 of 5 ileal aspirates, and in 1 of 3 ileostomy effluents. The IF in the ileal effluent was shown to be physiologically active; administration of effluent containing free IF and radioactive vitamin B_{12} to two subjects who lacked endogenous IF showed that the labeled vitamin was well absorbed. The demonstration of free IF in the lumen of the small intestine establishes the existence of one of the essential conditions that would enable vitamin B_{12} excreted in the bile to be reabsorbed in the ileum, thus maintaining the enterohepatic circulation.

0367 KINETICS OF BILE ACID METABOLISM IN EXPERIMENTAL BLIND LOOP SYNDROME. (Eng.) Bender, S.; Sauer, H.; Hoffmann, D. (Clinics of the J. W. Goethe-Univ., Frankfurt/M, W. Germany). *Gut* 16(12):927-931; 1975.

Bile salt metabolism was studied using Eriksson's washout technique in an experimental model of the contaminated small bowel syndrome of female Wistar rats. Bile salt secretion rate was increased from 204.7 ± SD 36.5 µmol/100 g/24 hr to 329.9 ± 146.6 pool size from 13.4 ± 5.4 µmol/100 g to 42.5 ± 7.2, and biliary flow from 6.6 ± 1.72 ml/100 g/24 hr to 8.4 ± 2.1. The author concludes that detailed analysis of washout curves gives indirect evidence of a short-ciruit jejunohepatic shunt in the model of contaminated small bowel syndrome. Parameters of this shunt were calculated with 9.1 µmol/100 g for short-circuit pool size and 13.8 for its circulation frequency.

0368 PROSPECTIVE COMPARISON OF INDIRECT METHODS FOR DETECTING LACTASE DEFICIENCY. (Eng.) Newcomer, A. D.; McGill, D. B.; Thomas, P. J.; Hofmann, A. F. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *N. Engl. J. Med.* 293(24):1232-1235; 1975.

Four indirect methods of detecting lactase deficiency were tested prospectively in 25 subjects with biopsy-proven lactase deficiency and in 25 subjects with normal lactase activity to compare sensitivity, specificity, and convenience of the tests. Each subject underwent all four tests. On one day, a p.o. lactose load (50 g in 500 ml water) was followed by a blood test (capillary plasma glucose) and two breath tests (hydrogen and $^{14}CO_2$). On another day, a p.o. lactose load was given together with ethanol, and capillary plasma concentration was measured. The sequence of tests was randomized. After ingestion of lactose, containing 1-^{14}C lactose, breath hydrogen was abnormally elevated in all 25 lactase-deficient subjects (> 0.30 ml/min at 2 hr); breath $^{14}CO_2$ was below the normal range in 23; and in 19 the plasma glucose increased by less than 20 mg/dl. When lactose and ethanol were given together, the rise in plasma galactose remained under 5 mg/dl in 24 of the lactase-deficient subjects. The specificity of the four tests was excellent, with only one false-positive plasma glucose test. Measurement of breath hydrogen was sensitive and specific, and did not require ethanol or isotopes. It was noninvasive, and was not influenced by gastric emptying or metabolic factors. The authors suggest that measurement of breath hydrogen is the most suitable test for population screening for lactase deficiency

0369 SECRETION OF EXOCRINE PANCREATIC ENZYMES IN PATIENTS WITH TROPICAL SPRUE, FOLLOWING STIMULATION BY A TEST MEAL. (Eng.) Balagopal, G.; Jacob, R.; Swarnabai, C.; Kapadia, C. R.; Mathan, V. I.; Baker, S. J. (Christian Medical Coll. Hosp., Vellore, Tamil Nadu, India). *Indian J. Med. Res.* 63(8):1138-1149; 1975.

Pancreatic function in response to a test meal was compared in 24 control subjects, 24 patients with tropical sprue, and 7 patients with chronic pancreatitis. The test meal, administered p.o., contained spray dried milk powder (48 g), dextrose (15 g), groundnut oil (6 g), polyethylene glycol (1% solution, 50 ml), and water (to make 250 ml). The nonabsorbable marker was used to estimate recovery of the meal from the duodenum. Trypsin, amylase, and esterase were measured, and the results were expressed both as concentration and total enzyme output per hour. Patients with tropical sprue had a significant reduction in pancreatic function compared with control subjects, as shown by a decreased output and decreased concentration of all three enzymes. The output of pancreatic enzymes in the sprue patients showed a significant correlation with the serum albumin concentration but not with any parameter of intestinal structure or function. The authors conclude that any one enzyme measurement would be sufficient for detection of severe pancreatic dysfunction. However, for studying minor degrees of pancreatic hypofunction, several enzymes should be measured.

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0371 PITFALLS IN TREATMENT OF COW'S MILK INTOLERANCE: SOY-MILK INTOLERANCE [Abstract]. (Eng.) Cadranel, S.; Rodesch, P.; Mozin, M. J.; Loeb, H. (No affiliation given). *Acta Paediatr. Scand.* 63(4):653; 1974.

0372 THE INTESTINAL BIOPSY IN 20 CASES OF INTOLERANCE TO COW'S MILK PROTEINS IN INFANCY [Abstract]. (Eng.) Fontaine, J. L.; Navarro, J.; Polonovski, C. (No affiliation given). *Acta Paediatr. Scand.* 63(4):652-653; 1974.

0373 CORRECTION OF GROWTH FAILURE IN A CHILD WITH MALABSORPTION, GIARDIASIS AND IMMUNE DEFICIENCY [Abstract]. (Eng.) Smith, E. R.; Gallagher, N. D.; Gatenby, P.; Howard, D. M. (Royal Prince Alfred Hosp., Sydney, NSW, Australia). *Aust. N.Z. J. Med.* 5(4):399; 1975.

0374 INTESTINAL DISACCHARIDASES IN GREENLAND ESKIMOS. (Eng.) Asp, N. G.; Berg, N. O.; Dahlqvist, A.; Gudmand-Hoyer, E.; Jarnum, S.; McNair, A. (Dept. Nutrition, Univ. Lund, S-220 07 Lund 7, Sweden). *Scand. J. Gastroenterol.* 10(5):513-519; 1975.

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0376 STUDIES ON INCORPORATION OF PALMITATE INTO HUMAN INTESTINAL MUCOSA. (Eng.) Sueur, R.; Cerf, M.; Costanzo, G. D.; Debray, C. (Hopital Bichat, F-75877 Paris CEDEX 18, France). *Digestion* 2(5-6):460-461; 1975.

0377 RELATIONSHIP OF MILK CONSUMPTION TO BLOOD GLUCOSE RISE IN LACTOSE INTOLERANT INDIVIDUALS. (Eng.) Paige, D. M.; Bayless, T. M.; Dellinger, W. S., Jr. (Johns Hopkins Medical Inst., Baltimore, MD). *Am. J. Clin. Nutr.* 28(7):677-680; 1975.

0378 LACTOSE INTOLERANCE AMONG MEXICAN AMERICANS. (Eng.) Sowers, M. F.; Winterfeldt, E. (Oklahoma State Univ., Stillwater, OK). *Am. J. Clin. Nutr.* 28(7):704-705; 1975.

0379 WHIPPLE DISEASE: OCCURRENCE IN A 76-YEAR-OLD MAN WITH A 20-YEAR PRODROME OF ARTHRITIS. (Eng.) DeLuca, R. F.; Silver, T. S.; Rogers, A. I. (Veterans Admin. Hosp., 1201 NW 16th St., Miami, FL 33125). *JAMA* 233(1):59-60; 1975.

0380 EXPERIENCE WITH PERORAL SMALL INTESTINAL BIOPSIES IN CHILDREN. (Ger.) Ploier, R.; Tulzer, W. (Landes-Kinderkrankenhaus, Krankenhausstrasse 26, A-4020 Linz, Austria). *Wien. Med. Wochenschr.* 125(37):523-526; 1975.

0381 GENERALIZED HYALINE DEGENERATION IN THE CAPILLARIES ASSOCIATED WITH DIARRHEA, INCREASED TRANSIT, VITAMIN B_{12} MALABSORPTION, PROTEIN-LOSING ENTEROPATHY, AND HEMORRHAGIC PROCTITIS: A NEW FAMILIAL DISEASE RELATED TO URBACH-WIETHE DISEASE. (Fre.) Rambaud, J.-C.; Lammens, P.; Galian, A.; Leclerc, J.-P.; Morel-Maroger, L.; Bernier, J. J. (No affiliation given). *Arch. Fr. Mal. App. Dig.* 64(3):275; 1975.

0382 PROTEIN-LOSING ENTEROPATHY AND RETRACTILE MESENTERITIS. (Fre.) Eugene, C; Nouel, O.; Gislon, J.; Marche, C. (Hopital Bichat, 170, boulevard Ney, F 75877 Paris Cedex 18, France). *Arch. Fr. Mal. App. Dig.* 64(3):275-276; 1975.

0383 MALABSORPTION ASSOCIATED WITH PRIMARY IMMUNOGLOBULIN A DEFICIENCY: ONE PATIENT WITH NO ATROPHY AT ONSET WHO LATER DEVELOPED VILLOUS ATROPHY. (Fre.) Dedieu, P.; Le Bodic, Le Mevel, B.; Miniconi, P. (No affiliation given). *Arch. Fr. Mal. App. Dig.* 64(3):276-277; 1975.

0384 HYPEROXALURIA ASSOCIATED WITH MALABSORPTION SYNDROMES. (Fre.) Modigliani, R.; Labayle, D.; Aymes, C. (Hopital Saint-Lazare, 107, rue du Faubourg-Saint-Denis, F 75010 Paris, France). *Nouv. Presse Med.* 4(36):2601; 1975.

0385 CELIAC DISEASE: CURRENT VIEWS. (Por.) Campos, J. V. M. (Rua Silvia, no 276, Sao Paulo, SP, 01331, Brazil). *Arq. Gastroenterol.* 12 (2):121-130; 1975.

0386 ATROPHIC SYNDROMES OF THE SMALL INTESTINE: CELIAC DISEASE. (Fre.) Moneret-Vautrin, D. A. (Hopital de Brabois, 54500 Vandoevre-les-Nancy, France). *Ouest Med.* 28(11):795-801; 1975.

See also, 0189, 0694, 0698.

LARGE INTESTINE

0387 HUMAN COLONIC ADENOCARCINOMA CELLS. I. ESTABLISHMENT AND DESCRIPTION OF A NEW LINE. (Eng.) Tom, B. H.; Rutzky, L. P.; Jakstys, M. M.; Oyasu, R.; Kaye, C. I.; Kahan, B. D. (Veterans Admin. Lakeside Hosp., Chicago, IL 60611). *In Vitro* 12(3):180-191; 1976.

A series of human colonic epithelial cell lines was cultured from a single adenocarcinoma patient, LS-180, the original adenocarcinoma; LS-174T, a trypsinized variant; and normal colonic tissue. The malignant cells, 20-40 μm in diameter and oval to polygonal, exhibited characteristics of normal colonic mucosal cells, namely, abundant microvilli prominent in secretory cells, and the presence of intracytoplasmic mucin vacuoles. The cultured adenocarcinoma cells demonstrated neoplastic properties by producing high levels of carcinoembryonic antigen (CEA) and by their ability to be propagated in hamster cheek pouches and in immunodeprived mice. The CEA production by the newly established line LS-180 released 900 times more CEA per cell into the culture medium and bore 30 times more cell-associated material than the established line, HT-29. These cell lines may permit detection of distinctive chemical, physiological, pharmacologic, and immunologic characteristics of neoplastic colonic cells.

0388 CARCINOEMBRYONIC ANTIGEN: ISOLATION OF A SUB-FRACTION WITH HIGH SPECIFIC ACTIVITY. (Eng.) Rogers, G. T.; Searle, F.; Bagshawe, K. D. (Charing Cross Hosp., London W6 8RF, England). *Br. J. Cancer* 33(4):357-362; 1976.

Four subfractions of carcinoembryonic antigen (CEA) were obtained by chromatography of conventional CEA on concanavalin A (Con A) Sepharose, and their immunoreactive contents were determined. Comparative studies showed that a fraction eluted with 2% methylglucoside (CEA 2B) had the highest activity, with a potency (60 U/μg) twice that of unfractionated CEA, although appreciable activity was also found in the other fractions. The amino acid composition of CEA 2B was similar to that reported for conventional CEA but there was a lower content of neutral hexoses and a comparatively high content of *N*-acetylglucosamine. Experiments with a pool of sera from 11 patients with colonic cancer, which had been fractionated on Con A-Sepharose, showed that nearly all CEA activity was contained in a fraction eluted with 2% methylglucoside.

0389 MIGRATION INHIBITION WITH VARIOUS CELL FRACTIONS IN HUMAN COLORECTAL CANCER. (Eng.) Armitstead, P. R.; Gowland, G. (Univ. Leeds, The General Infirmary, Leeds, U.K.). *Gut* 16(12): 968-972; 1975.

The unseparated WBC, separated mononuclear cells, and granulocytes of six control subjects and nine patients with colorectal cancer were studied by direct cell migration inhibition. A migratory index was calculated from migration in the presence and absence of a perchloric acid extract of large bowel tumors. In 10% homologous AB serum, no significant migration inhibition occurred with any of the cells from control subjects. Five of the nine cancer patients showed significant inhibition with their unseparated WBC, seven of seven with their mononuclear cells, and none of nine with their granulocytes. In 10% autologous serum, some controls exhibited migration inhibition with their unseparated WBC and their granulocyte fraction, but not with the mononuclear cell fraction. In the presence of autologous serum, migration inhibition was also apparent in the granulocyte fraction of the cancer patients. It is concluded that (a) with a soluble tumor antigen preparation, a mononuclear cell population increases the sensitivity of the direct migration inhibition test and (b) autologous serum may interfere directly with the migration of granulocytes by an action not dependent upon the release of inhibitory factors from sensitized lymphocytes. This could explain some of the inconsistencies of the assay when using an unseparated WBC population.

0390 PREMALIGNANCY OF THE MUCOSAL POLYP IN THE LARGE INTESTINE: I. HISTOLOGIC GRADATION OF THE POLYP ON THE BASIS OF EPITHELIAL PSEUDOSTRATIFICATION AND GLANDULAR BRANCHING.

(Eng.) Kozuka, S. (Nagoya Univ. Sch. Medicine, 65 Tsurumaicho, Showaku, Nagoya, 466, Japan). *Dis. Colon Rectum* 18(6):483-493; 1975.

Two types of classification for the objective gradation of premalignant stages of mucosal polyps in the large intestine are presented. Biopsy specimens of mucosal polyps and invasive carcinomas of the large intestine and rectum (130) were collected from 360 Japanese patients. The first classification system is based mainly on pseudostratification of the glandular epithelium, and the second on branching of the gland. Six stages of the former are described. Grade 0 differs from normal mucosa only in mucosal thickening. Grade I has enlargement of glandular lumens and elongation of glands. Grade II is characterized by crowding of tall, narrow epithelial cells and elongation of epithelial nuclei, but no psuedostratification. Grade III shows apparent pseudostratification and frequent mitotic figures, but the level of nuclear position is limited to the basal half of the height of the glandular epithelium (except for mitotic nuclei). Grade IV is characterized by severe pseudostratification of glandular epithelium, but only mitotic nuclei occupy the upper epithelium. Grade V has extremely severe pseudostratification of the glandular epithelium and nuclei scattered throughout the height of the epithelium. This grading system when applied to the biopsy specimens, was in excellent agreement with increases in mitotic figures, nuclear chromatin, and pleomorphism, and decreases in mucin secretion. Foci and/or tendency towards glandular fusion and/or glands back-to-back were found in 26/28 polyps with grade V pseudostratification, compared to 2/202 polyps of grade 0-IV. Adenomatous residues of grade III and/or IV were found in 42/130 cases of invasive carcinoma, suggesting an intimate relation of adenoma to the induction of adenocarcinoma. Hyperplastic residues of grade I or II pseudostratification were found in about half of 130 cases. The extent of glandular branching paralleled the pseudostratification grading; most polyps with secondary branching had a narrower stroma than those that had primary branching only. Foci and/or tendency towards glandular fusion and/or glands back-to-back were found in 25/56 with secondary branching, in 3/121 with primary branching only, and in 1/53 without branching. The results suggest a gradual progression from normal tissue to invasive carcinoma through the process of hyperplasia, adenoma, and carcinoma *in situ*.

0391 PREMALIGNANCY OF THE MUCOSAL POLYP IN THE LARGE INTESTINE: II. ESTIMATION OF THE PERIODS REQUIRED FOR MALIGNANT TRANSFORMATION OF MUCOSAL POLYPS.

(Eng.) Kozuka, S.; Nogaki, M.; Ozeki, T.; Masumori, S. (Nagoya Univ. Sch. Medicine, 65 Tsurumaicho, Showaku Nagoya, 466, Japan). *Dis. Colon Rectum* 18(6):494-500; 1975.

The relation between age of the patient and histologic grade, based on epithelial pseudostratification, of mucosal polyps (331 polyps from 324 patients) was compared with the relation between age and histologic grade of invasive carcinoma of the large intestine (261 surgical cases and 3,178 autopsy cases). Age ranged widely from newborn to over 95 yr, but the average age of patients increased steadily with the advance of histologic atypism from 40.7 yr with grade I polyp to 58.7 yr with invasive cancer. From the differences in average ages of the patients, intervals that might be required for polyps of each grade to become malignant were calculated. The results were 3.6 yr for polyps of grade V, 8.3 yr for grade IV, 11.4 yr for grade III, 13.1 yr for grade II, and 18 yr for grade I. Grade 0 did not follow this general progression; the age difference from patients whose cancers were found at autopsy was 15.1 yr. However, this group was considerably smaller than the others studied. The authors suggest that examination and polypectomy at 5-yr intervals after 35 yr of age might be sufficient to protect against invasive carcinoma of the large intestine.

0392 RISK OF RECURRENCE OF COLON POLYPS.

(Eng.) Henry, L. G.; Condon, R. E.; Schulte, W. J.; Aprahamian, C.; DeCosse, J. J. (Wood Veterans Admin. Center, Milwaukee, WI). *Ann. Surg.* 182(4):511-515; 1975.

Patients (268) who had a polypectomy were followed up to 20 yr with semiannual proctosigmoidoscopic and barium enema examinations. Patients having coexisting carcinoma, chronic inflammatory disease, and those lost to follow-up were excluded; 154 patients followed for a mean of 7 yr comprised the study group. Thirty percent developed recurrent polyps. The risk of recurrence during the first year was 16 times that expected in a population of similar age and sex, but thereafter diminished steadily. After 48 months, risk of polyp recurrence was little higher than the incidence expected in a normal population. Neither age, presenting symptoms, nor the site or size of the initial polyp(s) were of any prognostic value regarding recurrence. Patients presenting with a villous adenoma or with more than three polyps had a significantly increased risk of recurrence. Of those who developed one recurrent polyp, one-third developed another recurrence. In this subgroup, although numbers were small, the risk of developing further recurrence could persist indefinitely. The overall incidence of colonic carcinoma may have been increased, but the location of subsequent cancer was not related to the site of a previously excised polyp.

0393 A REAPPRAISAL OF STAGING AND THERAPY FOR PATIENTS WITH CANCER OF THE RECTUM: II. PATTERNS OF PRESENTATION AND OUTCOME OF TREATMENT.

(Eng.) Feinstein, A. R.; Schimpff, C. R.; Hull, E. W. (West Haven Veterans Admin. Hosp., West Haven, CT). *Arch. Intern. Med.* 135(11):1454-1462; 1975.

Two new systems of staging were employed for analysis of the anatomic and symptomatic features at presentation (zero time), the selection bias in choice of treatment, and the outcome of 318 patients with rectal cancer. One system, based on data available before the zero time treatment, was applied to all patients regardless of therapy. The other system included information noted after surgical exploration and was applied to patients whose rectal cancer was resected. Selectional bias was evident in therapeutic decisions. The patients chosen for surgical exploration and possible resection came mainly from prognostically favorable stages and had higher survival rates than the inoperable patients even when the tumor was not resected. In patients with tumors located 8 cm or higher above the anus, survival rates in each composite symptom-anatomic stage were essentially similar with radical and simple resections. Radical surgery gave better survival rates than simple surgery for tumors at 5-7 cm and was an anatomic necessity to remove tumors at 0-4 cm. Regardless of the extensiveness of surgery, the symptom-anatomic stages were directly related to rates of postoperative infection, postoperative death, subsequent quality of life, and deaths due either to cancer or to noncancer causes. This study reaffirms the necessity for incorporating an additional, separate staging of patients' symptoms. The results demonstrate the importance of considering, classifying, and analyzing the total biologic behavior of the tumor, rather than its morphology alone, for estimating prognosis and evaluating treatment in patients with rectal cancer.

0394 FUNCTION OF THE ANAL SPHINCTERS IN PATIENTS WITH INTUSSUSCEPTION OF THE RECTUM. (Eng.) Frenckner, B.; Ihre, T. (Serafimer Hosp., Stockholm, Sweden). *Gut* 17(2):147-151; 1976.

Anal sphincter function was examined in 15 women with intussusception of the rectum (6 with anal incontinence and 9 continent). Anal pressure was recorded continuously during rest, during maximal voluntary squeezing of the anal muscles, and during gradual expansion of the rectum by means of a balloon inserted into the rectal ampulla. The maximal anal pressure at rest was lower ($p<0.001$) in incontinent patients (31 mm Hg ± 5.6) than the continent (67 mm Hg ± 4.3), and the former had significantly smaller relaxations of the internal sphincter upon rectal distension ($p<0.05$). The increase in anal pressure during voluntary squeezing, a function of the external sphincter, did not differ significantly compared with healthy subjects in either incontinent or continent patients. It is concluded that the function of the internal sphincter is impaired in the incontinent patients.

0395 COLONIC MYOELECTRIC ACTIVITY IN THE IRRITABLE BOWEL SYNDROME. (Eng.) Snape, W. J., Jr.; Carlson, G. M.; Cohen, S. (Dept. Medicine, Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *Gastroenterology* 70(3):326-330; 1976.

Rectal and rectosigmoid myoelectric activities were compared in 10 normal subjects and in 12 patients (7 women and 5 men, aged 23-69 yr) with irritable bowel syndrome (IBS) to determine whether the syndrome is principally a motor disturbance of the large intestine. Placement and removal of the electrodes had no adverse effects on the subjects or patients. Basic electrical rhythm (BER), spike potential activity, and intraluminal pressure were recorded in both groups. In each individual, two types of BER were recorded. The major component of the BER had a frequency of about 6 cycles/min while the minor component had a frequency of 3 cycles/min. In normal subjects, the BER was present at 6.0 cycles/min and no spike potential activity was noted. In patients, the BER frequency was 3 cycles/min and spontaneous spike potential and contractile activity were present. The myoelectric activity differed in normal subjects and patients in the percentage of time occupied by each of the two types of BER. In the patients, the slower frequency BER was recorded for a greater proportion (44% of the total BER as compared to 10% for controls) of time in both the rectum and rectosigmoid. In the patients, differences in myoelectric activity could not be correlated with specific symptoms or duration of illness. Neither age nor sex influenced myoelectric parameters. This study failed to demonstrate a difference in basal colonic contractile activity in normal subjects and in patients with the IBS. Under conditions where the motor activity is similar to that in normal subjects, patients with IBS have a significant difference in the properties of the distal large intestine, suggesting that the abnormalities in colonic motor response may be related to the difference in colonic BER.

0396 APPENDICITIS AND CYSTIC FIBROSIS. (Fre.) Feigelson, J.; Audebaud, G.; Toty, L. (Hopital Foch, Rue Worth, 92 Suresness, France). *Med. Chir. Dig.* 4(1):51-53; 1975.

0397 THE LEUCOCYTE MIGRATION INHIBITION TEST IN CANCER IMMUNOLOGY [Abstract]. (Eng.) Armitstead, P. R.; Gowland, G.; Giles, G. R. (St. James's Hosp., Leeds, England). *Br. J. Surg.* 62(8):661; 1975.

0398 COLLAGEN METABOLISM IN INFECTED COLONIC ANASTOMOSES [Abstract]. (Eng.) Irvin, T. T. (Royal Infirmary, Sheffield, England). *Br. J. Surg.* 62(8):659; 1975.

0399 THE EFFECT OF NOXYTIOLIN (NOXYFLEX) IN PERITONITIS DUE TO PERFORATED APPENDICITIS [Abstract]. (Eng.) King, D. W.; Gurry, J. F.; Ellis-Pegler, R. B.; Brooke, B. N. (St. George's Hosp., Medical Sch., London, England). *Br. J. Surg.* 62(8):659; 1975.

0400 ACTION OF A STERCULIA BULK-FORMING AGENT AND SMOOTH MUSCLE RELAXANT VERSUS BRAN IN DIVERTICULAR DISEASE [Abstract]. (Eng.) Srivastava, G.; Smith, A. N.; Painter, N. (Dept. Clinical Surgery, Univ. Edinburgh, Edinburgh, Scotland). *Br. J. Surg.* 62(8):657; 1975.

0401 INJURIES OF THE COLON AND RECTUM. (Eng.) Coughlin, M.; Trunkey, D. D.; Schrock, T. K. (San Francisco General Hosp., San Francisco, CA 94110). *West. J. Med.* 123(3):236-239; 1975.

0402 TREATMENT OF OBSTRUCTING CANCER OF THE COLON AND RECTUM. (Eng.) Clark, J.; Hall, A. W.; Moossa, A. R. (Walton Hosp., Liverpool, England). *Surg. Gynecol. Obstet.* 141(4):541-544; 1975.

0403 TREATMENT OF CARCINOMA OF THE RECTUM BY INTRACAVITARY IRRADIATION. (Eng.) Sischy, B.; Remington, J. H. (Highland Hosp., Univ. Rochester Sch. Medicine, Rochester, NY). *Surg. Gynecol. Obstet.* 141(4):562-564; 1975.

0404 SYMPTOMATIC LIPOMAS OF THE GASTROINTESTINAL TRACT. (Eng.) Ackerman, N. B.; Chughtai, S. Q. (Dept. Surgery, Univ. Missouri-Kansas City, Kansas City, MO). *Surg. Gynecol. Obstet.* 141(4):565-568; 1975.

0405 COLOSTOMY: INTRAPERITONEAL OR EXTRAPERITONEAL CLOSURE? (Eng.) Adeyemo, A.; Gaillard, W. E., Jr.; Ali, S. D.; Calhoun, T.; Kurtz, L. H. (Howard Univ. Surgical Service, District of Columbia General Hosp., Washington, DC). *Am. J. Surg.* 130(3):273-274; 1975.

0406 HEMANGIOMAS OF THE CECUM, GASTROINTESTINAL HEMORRHAGE AND CARDIOVASCULAR INSUFFICIENCY, A NEWLY RECOGNIZED SYNDROME [Abstract]. (Eng.) Rogers, B. G. H.; Adler, F. (Grant Hosp., Chicago, IL). *Gastrointest. Endosc.* 21(4):195; 1975.

0407 VALUE OF COLONOSCOPY IN ANTIBIOTIC-RELATED COLITIS [Abstract]. (Eng.) Roseman, D. M.; Elliott, M. L. (Scripps Memorial Hosp., San Diego, CA). *Gastrointest. Endosc.* 21(4):195; 1975.

0408 NON-OPERATIVE REDUCTION OF SIGMOID VOLVULUS WITH THE COLONOSCOPE [Abstract]. (Eng.) Samet, E. T.; Northwest Hosp., Chicago, IL). *Gastrointest. Endosc.* 21(4):195; 1975.

0409 TECHNIC OF COLONOSCOPIC ELECTROSNARE EXCISION OF SESSILE POLYPOID TUMORS [Abstract]. (Eng.) Rand, A. A. (Albert Einstein Coll. Medicine, Bronx, NY). *Gastrointest. Endosc.* 21(4):194; 1975.

0410 ENDOSCOPIC MARKING OF COLONIC LESIONS [Abstract]. (Eng.) Ponsky, J. L.; King, J. F. (Timken Mercy Hosp., Canton, OH). *Gastrointest. Endosc.* 21(4):194; 1975.

0411 COLONOSCIPIC POLYPECTOMY--SUBCLINICAL PERFORATION [Abstract]. (Eng.) Overholt, B. F.; Hargrove, R. L.; Farris, R. K. (St. Mary's Memorial Hosp., Knoxville, TN). *Gastrointest. Endosc.* 21(4):193; 1975.

0412 EMERGENCY COLONOSCOPY IN ACUTE HEMORRHAGE PER RECTUM [Abstract]. (Eng.) Gaisford, W. D. (Latter-Day Saints Hosp., Salt Lake City, UT). *Gastrointest. Endosc.* 21(4):187; 1975.

0413 COLONOSCOPY-ASSOCIATED BACTEREMIA: A CLINICAL ENTITY [Abstract]? (Eng.) Fasrell, R. L.; Dickman, M. D.; Higgs, R. H.; Humphries, T. J.; Chappelka, A. R. (Naval Regional Medical Center, Philadelphia, PA). *Gastrointest. Endosc.* 21 (4):187; 1975.

0414 RESULTS OF RESECTION FOR DIVERTICULAR DISEASE AND ITS COMPLICATIONS [Abstract]. (Eng.) Rennie, J. A.; Charnock, M. C.; Wellwood, J. M.; Todd, I. P. (St. Bartholomew's Hosp., London ECIA 7BE, England). *Proc. R. Soc. Med.* 68(9): 575; 1975.

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0416 SOLITARY ULCER OF THE RECTUM [Abstract]. (Eng.) Rowland, R.; Hecker, R.; Willing, R. L. (Royal Adelaide Hosp., Adelaide, South Australia). *Aust. N.Z. J. Med.* 5(4):399-400; 1975.

0417 THE EFFECT OF HIGH AND LOW RESIDUE DIETS ON SYMPTOMS ASSOCIATED WITH COLONIC MOTILITY DISORDERS [Abstract]. (Eng.) Hennessy, W. B.; Byrnes, D. J.; Silbree, E. W. (St. Vincent's Hosp., Sydney, NSW, Australia). *Aust. N.Z. J. Med.* 5(4):400; 1975.

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0419 TREATMENT OF CONSTIPATION OF THE AGED. (Fre.) Bensaude, A.; de Moraes, A. (Hopital du Raincy, Paris, France). *Ann. Gastroenterol. Hepatol.* 11(2):119-134; 1975.

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0422 DIET, INTESTINAL FLORA, AND COLON CANCER. (Eng.) Anonymous. (No affiliation given). *Nutr. Rev.* 35(5):136-137; 1975.

0423 PSEUDOMYXOMA PERITONEI OF APPENDICEAL ORIGIN: A CASE REPORT. (Eng.) Sharma, M. M.; Naik, S. R.; Nair, S. K.; Chuttani, H. K. (Maulana Azad Medical Coll., New Delhi, India). *Indian J. Surg.* 37(1):39-40; 1975.

0424 CARCINOMA OF THE COLON PRESENTING AS ACUTE APPENDICITIS: REPORT OF ONE CASE. (Fre.) Lefort, J.; Mitrofanoff, P.; Borde, J. (Hopital Charles-Nicolle, 76000 Rouen, France). *Ann. Chir. Infant.* 15(6):467-474; 1974.

0425 INTESTINAL PNEUMATOSIS AND ULCERO-NECROTIC ENTEROCOLITIS. (Fre.) Ionesco, G.; Gavrilta, N. (Clinique de Chirurgie Infantile et d'Orthopedie, Jassy, Rumania). *Ann. Chir. Infant.* 16 (1):63-72; 1975.

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0428 MUCINOUS ADENOCARCINOMA SUPERVENING IN ANORECTAL FISTULA. (Eng.) Yague, S. (San Juan de la Cruz Hosp., Ubeda, Spain). *Abdom. Surg.* 17(10):229-230; 1975.

0429 ANASTOMOTIC LEAKAGE FOLLOWING RESECTION FOR CANCER OF THE COLON AND RECTUM. (Eng.) Hoier-Madsen, K.; Hansen, J. B.; Lindenberg, J. (Frederiksberg Hosp., Copenhagen, Denmark). *Acta Chir. Scand.* 141(4):304-309; 1975.

0430 FACTORS INFLUENCING LOCAL RECURRENCE AFTER ABDOMINOPERINEAL RESECTION FOR CANCER OF THE RECTUM AND RECTOSIGMOID. (Eng.) Moossa, A. R.; Ree, P. C.; Marks, J. E.; Levin, B.; Platz, C. E.; Skinner, D. B. (Dept. Surgery, Radiology, Medicine, Pathology, Univ. Chicago, Chicago, IL). *Br. J. Surg.* 62(9):727-730; 1975.

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0434 THE FIRST ENDOSCOPIC LASER COAGULATION IN THE HUMAN GI-TRACT. (Eng.) Fruhmorgen, P.; Bodem, F.; Reidenbach, H. D.; Kaduk, B.; Demlin, L.; Brand, H. (Med. Univ.-Klinik, D-852 Erlangen, Krankenhausstr. 12, Germany). *Endoscopy* 7(3):156-157; 1975.

0435 RESULTS OF THE Z-SHAPED ANASTOMOSIS FOR HIRSCHSPRUNG'S DISEASE. (Eng.) Ikeda, K.; Kume, K.; Nagasaki, A.; Suita, S. (Second Dept. Surgery, Kyushu Univ., Fukuoka, Japan). *Prog. Pediatr. Surg.* 8:97-108; 1975.

0436 INFLAMMATORY TUMORS OF THE CECUM. (Fre.) Sicard, J.-L.; Flabeau, F. (Hopital Tenon, 4, rue de la Chine, 75970 Paris Cedex 20, France). *J. Chir. (Paris)* 109(1):5-22; 1975.

See also, 0016, 0052, 0195, 0196, 0197, 0205, 0285, 0339, 0343, 0347, 0381, 0393, 0439, 0518, 0743, 0744, 0746, 0760.

LARGE INTESTINE

Ulcerative Colitis

0437 THE DIAGNOSIS OF COLITIS BY COLONOSCOPY WITH BIOPSY AND X-RAY EXAMINATION. A BLIND COMPARATIVE STUDY. (Eng.) Myren, J.; Eie, H.; Serck-Hanssen, A. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 11(2):141-144; 1976.

The use of colonoscopy and biopsy in the diagnosis of colitis was compared with x-ray examination in a blind study of 40 patients (21 women). Biopsy specimens (185) were obtained from the rectal and colonic mucosa. The x-ray examination was performed within 1 week after the colonoscopy, using a conventional barium enema. A complete agreement between the colonoscopic diagnosis and that of the directed biopsy was found in 33 cases and major disagreements were found in three cases. A complete agreement between the colonoscopic and x-ray diagnoses were obtained in 22 patients and minor disagreements were seen in 16 cases, most of whom showed unspecific nonulcerative colitis. In three cases with ulcerative colitis, a normal colon was found by x-ray. A higher percentage of cases showed decreased haustration by x-ray examination than by colonoscopy, whereas a fairly equal percentage of ulceration was detected by the two methods. Erosions, mucus covering, edema, vascular injection, and bleeding were not detected by x-ray examination. The results demonstrate that differentiation between a normal colonic mucosa and that with alterations without ulcerations (unspecified colitis) is difficult with x-ray examination. However, colonoscopy results agreed favorably with those of histology on directed biopsy. A good correlation was found between colonoscopy and x-ray examination in the detection of mucosal ulcerations.

0438 DIARRHOEA AND COLITIS ASSOCIATED WITH ANTIBIOTIC TREATMENT: A REPORT OF 16 CASES. Gibson, G. E.; Rowland, R.; Hecker, R. (Royal Adelaide Hosp., Adelaide, Australia). *Aust. N.Z. J. Med.* 5(4):340-347; 1975.

A series of 16 patients (19 to 85-yr-old, 5 men and 11 women) with diarrhea of varying severity developing within 21 days of antibiotic therapy is reported. In 12/16 cases, the onset of symptoms followed the administration of lincomycin or clindamycin; ampicillin was implicated in 2 and methicillin and bactrim in one each. All patients who had taken lincomycin developed diarrhea within 14 days. Three cases are briefly cited as examples of mild, moderate, and severe disease. A 29-yr-old woman developed diarrhea 4 days after starting clindamycin, with up to 10 stools/day, blood and mucus in the stools, and a 14-lb weight loss. Sigmoidoscopy revealed low grade colitis with a histologic diagnosis of nonspecific colitis. A 74-yr-old woman on lincomycin and cephalexin developed diarrhea 8 days after a total hip replacement. Thirty days later she was febrile, confused, dehydrated, and continually incontinent. Barium enema showed widespread ulceration of the colon, and sigmoidoscopy revealed pseudomembranous colitis. Severe colitis developed over 40 days in an 83-yr-old woman on prophylactic lincomycin after total hip replacement. Eighteen days postoperatively, a barium enema revealed sigmoid diverticular disease. Sigmoidoscopy at 30 days showed acute colitis. Toxic megacolon developed by the 40th postoperative day. Ten of the 16 patients made a complete recovery, 2 achieved a gradual recovery, and 4 (2 of whom had colectomies) died. This study indicates that colitis developing during or after antibiotic therapy may be pseudomembranous or nonspecific type. The authors conclude that although antibiotics may be implicated in the development of colitis, other etiologic factors should also be considered.

0439 COMPARISON OF BOWEL FUNCTION AFTER ILEORECTAL ANASTOMOSIS FOR ULCERATIVE COLITIS AND COLONIC POLYPOSIS. (Eng.) Newton, C. R.; Baker, W. N. W. (Middlesex Hosp., London WlN 8AA, England). *Gut* 16(10):785-791; 1975.

Bowel habit was studied in 92 outpatients (43 men and 49 women, aged 19-67 yr) with ileorectal anastomosis for ulcerative colitis and compared with that in 45 outpatients (30 men and 15 women, aged 20-72 yr) with ileorectal anastomosis for colonic polyposis. Bowel frequency ranged from 1.7 to 8.7 stools/24 hr (mean, 4.5) in the colitic group compared with a range of 1.3 to 8.1 stools/24 hr (mean, 3.5) in the polyposis group. Eighty-two percent of the colitic group and 95% of the polyposis group had six or fewer bowel actions/24 hr. In those patients with more than six bowel actions/24 hr, a higher percentage (71%) were in poor general condition preoperatively than in the groups with three to six bowel action/24 hr (37%) and less than three/24 hr (24%). Urgency of defecation was rare; 78% of the colitic group and 83% of the polyposis group were able to delay defecation for 30 min or longer. Bowel actions every night and occasional fecal incontinence occurred in small but similar percentages of patients in both groups. Fifty-one percent of patients in the colitic group, as compared with 9% in the polyposis group, were taking regular treatment to improve bowel function. Dietary difficulty was rare after ileorectal anastomosis in both colitic and polyposis groups. The authors conclude that this study provides a valid assessment of bowel function 6 months or more after ileorectal anastomosis for ulcerative colitis.

0440 CREATINE AND AMINO ACID PROFILES OF ILEAL AND FAECAL FLUIDS [Abstract]. (Eng.) Padovan, W.; Owens, C. W. I.; Ferguson, R. (Birmingham General Hosp., Birmingham, England). *Clin. Sci. Mol. Med.* 49(3):27p; 1975.

0441 CLINICAL SIGNIFICANCE OF THE NEUTROPHILIC LYSIS INDEX IN CHRONIC ENTEROCOLITIS. (Rus.) Kryshen, P. F.; Shamshonkova, G. P. (Dniepropetrovsky Res. Inst. Gastroenterology, USSR). *Vrach. Delo* (5):98-101; 1975.

0442 CHRONIC ULCERATIVE COLITIS. (Eng.) Bargen, J. A. (Dept. Medicine, Univ. California, Irvine, CA). *Hosp. Med.* 11(8):6-21 *passim;* 1975.

0443 PROSPECTIVE STUDY OF RECENTLY DIAGNOSED CASES OF ULCERATIVE COLITIS AND REGIONAL ENTEROCOLITIS (CROHN'S DISEASE) IN NORWAY. (Nor.) Myren, J.; Rygvold, O. (Ulleval Hosp., Oslo, Norway). *Tidsskr. Nor. Laegeforen.* 94(31):2143-2165; 1974.

0444 CONDITION OF THE LIVER IN PATIENTS WITH NONSPECIFIC ULCERATIVE COLITIS. (Rus.) Chernomordik, A. E.; Levitan, M. K.; Kapuller, L. L.; Mikhailova, T. A. (Scientific Res. Lab. Clinic Proctology, Ministry Public Health Russian SSR, Moscow, USSR). *Sov. Med.* (2):96-100; 1975.

0445 SERUM DISEASE WITH SECONDARY PSEUDOLYMPHATIC GANGLIAL HYPERPLASIA AFTER SALICYLAZOSULFAPYRIDINE TREATMENT. (Fre.) Delage, C.; Lagace, R. (Faculty Medicine, Univ. Laval, Quebec, Canada). *Union Med. Can.* 104(4):579-584; 1975.

0446 THE POSSIBLE ROLE OF A MICROBIOLOGICAL FACTOR IN THE PATHOGENESIS OF ULCERATIVE COLITIS. (Rus.) Gokhberg, S. L.; Rasulev, N. I. (Res. Inst. Regional Medicine, Tashkent, USSR). *Arkh. Patol.* 37(5):40-45; 1975.

0447 THE SURGICAL TREATMENT OF ULCERATIVE PROCTOCOLITIS AND CROHN'S DISEASE OF THE LARGE INTESTINE. (Ger.) Novak, J.; Jaros, K. (Bulovka Hosp., 180-81 Prague 8, Czechoslovakia). *Zentralbl. Chir.* 100(10):618-621; 1975.

0448 SERUM AND TISSUE IMMUNOGLOBULINS IN PATIENTS WITH CHRONIC PROCTITIS [Abstract]. (Eng.) Heatley, R. V.; Whitehead, R. H.; Rhodes, J.; Calcraft, B. J.; Fifield, R. (Univ. Hosp. Wales, Wales, Great Britian). *Gut* 16(10):833; 1975.

0449 GLUCOSAMINE SYNTHETASE ACTIVITY IN THE COLONIC MUCOSA IN ULCERATIVE COLITIS AND CROHN'S DISEASE [Abstract]. (Eng.) Goodman, M. J.; Kent, P. W.; Truelove, S. C. (Radcliffe Infirmary, Oxford, England). *Gut* 16(10):833; 1975.

0450 COMPLEMENT IN INFLAMMATORY BOWEL DISEASE [Abstract]. (Eng.) Hodgson, H. J. F.; Potter, B. J.; Jewell, D. P. (Royal Free Hosp., London, England). *Gut* 16(10):833-834; 1975.

See also, 0431, 0758, 0765.

PANCREAS

0451 ANGIOGRAPHY VS. PANCREATOGRAPHY IN DIAGNOSIS OF CARCINOMA OF THE PANCREAS. (Eng.) Clouse, M.; Gregg, J. A.; Sedgwick, C. E. (New England Deaconess Hosp., Boston, MA). *Radiology* 114(3):605-610; 1975.

The relative efficacy of angiography and pancreatography in the diagnosis of pancreatic carcinoma was compared in 13 patients. Pancreatography provided a correct preoperative diagnosis in all 10 patients studied. In three patients the duct could not be cannulated. Twelve patients underwent angiography, and a correct diagnosis was made in 10. Preoperative diagnosis was not made by either technique in one patient. Pancreatography did not detect carcinoma of the pancreas at an earlier stage than did angiography and resectability of the tumor. Angiography defined the size, extension, and resectability of the tumor, while pancreatography outlined the internal architecture of the gland and duct system. The authors conclude that these procedures should be considered complementary to each other.

0452 ANGIOGRAPHIC FEATURES OF SQUAMOUS CELL CARCINOMA OF THE PANCREAS. (Eng.) Sprayregen, S.; Schoenbaum, S. W.; Messinger, N. H. (Montefiore Hosp., 111 East 210th St., Bronx, NY 10467). *J. Can. Assoc. Radiol.* 26(2):122-124; 1975.

The angiographic findings in squamous cell carcinoma of the pancreas in a 53-yr-old women and a 72-yr-old man are reported. Tumor blushes were present in both cases, and one case showed hypervascularity. These angiographic features distinguish this lesion from the typical adenocarcinoma of the pancreas. It is suggested that squamous cell carcinoma be considered when hypervascularity or a tumor blush is demonstrated in the pancreas.

0453 MANAGEMENT OF PANCREATIC ASCITES. (Eng.) Stephens, D. B.; Martin, C. E.; Sawyers, J. L. (Vanderbilt Univ. Medical Center, Nashville, TN 37210). *South. Med. J.* 68(10):1234-1238; 1975.

Case studies of two patients with persistent pancreatic ascites who were managed successfully by internal drainage are presented. Case 1, a 33-yr-old male alcoholic, presented with epigastric abdominal pain, weakness, and abdominal swelling. Results of a complete blood count and bilirubin determination were normal; the serum albumin concentration was low, while serum alkaline phosphatase, SGOT, and serum amylase were high. An exploratory laparotomy revealed a large retrogastric

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pancreatic pseudocyst involving the head and body of the pancreas. The abdominal cavity contained 3.5 l of ascitic fluid. A cystogastrostomy and liver biopsy were done. Case 2, a 50-yr-old male alcoholic, complained of abdominal pain with persistent nausea and vomiting. Blood count was normal, and bilirubin, alkaline phosphatase, and serum amylase values were high. A barium meal revealed a retrogastric mass, and an exploratory laparotomy showed that the abdominal cavity contained 4 l of ascitic fluid and a large retrogastric pseudocyst. There was a fistula on the anterior surface of the pancreas. An operative pancreatogram revealed a communication with the duct of Wirsung and a small pseudocyst in the tail of the pancreas. A Roux-en-Y limb of jejunum was anastomosed directly to this fistula. Follow-up examinations of both patients failed to demonstrate any recurrence of ascites. A trial of nonoperative treatment with nasogastric intubation and i.v. hyperalimentation is recommended for patients with pancreatic ascites. Patients who fail to improve usually have pancreatic duct disruption and should have internal drainage operation and/or distal pancreatic resection.

0454 A COMPARATIVE EVALUATION OF PANCREATIC ANGIOGRAPHY AND ENDOSCOPIC RETROGRADE PANCREATIC DUCTOGRAPHY [Abstract]. (Eng.) Weckstein, M. M.; Wong, K. H.; Schuman, B. M.; Torbey, P. (Henry Ford Hosp., Detroit, MI). *Gastrointest. Endosc.* 21(4):198; 1975.

0455 PANCREATOGRAPHY THROUGH GIF-DK [Abstract]. (Eng.) Villa, F.; Garcia, L.; Steigmann, F. (Hektoen Inst. Medical Res., Chicago, IL). *Gastrointest. Endosc.* 21(4):197; 1975.

0456 ISOLATED GASTRIC VARICES IN PANCREATIC CARCINOMA--A NEW SIGN [Abstract]. (Eng.) Overholt, B. F.; Hargrove, R. L. (St. Mary's Memorial Hosp., Knoxville, TN). *Gastrointest. Endosc.* 21(4):193; 1975.

0457 THE EFFECT OF SLOW, PROGRESSIVE CONSTRICTION ON THE PROXIMAL PART OF THE RABBIT PANCREAS. (Ita.) Canino, V.; Gaia, E.; Giacardi, A. (Greater Hospital of St. John the Baptist, Torino, Italy). *Minerva Chir.* 30(12):728-730; 1975.

0458 ANNULAR PANCREAS WITH CHOLEDOCHOLITHIASIS. (Eng.) Gunasagaran, T.; Venkataraman, M. S.; Rao, R. N. (Madras Medical Coll., Madras, India). *Indian J. Surg.* 37(1):36-38; 1975.

0459 TRIAL OF ARTIFICIAL DIET IN TREATMENT OF CYSTIC FIBROSIS OF PANCREAS. (Eng.) Barclay, R. P. C.; Shannon, R. S. (Stobhill General Hosp., Glasgow G21 3UW, Scotland). *Arch. Dis. Child.* 50(6):490-493; 1975.

0460 GRANULAR-CELL MYOBLASTOMA IN PANCREAS. (Eng.) Wellmann, K. F.; Tsai, C. Y.; Reyes, F. B. (Kingsbrook Jewish Medical Center, Brooklyn, NY). *N.Y. State Med. J.* 75(8):1270; 1975.

0461 ACINAR CELL CARCINOMA OF PANCREAS. (Eng.) Chung, C. (Tri-Service General Hosp., Republic of China). *Chin. Med. J.* 21(4):227-234; 1974.

0462 PANCREATIC PSEUDOCYSTS. (Eng.) Elliot, D. W. (Veterans Admin. Hosp., Univ. Drive C, Pittsburgh, PA). *Surg. Clin. North Am.* 55(2):339-362; 1975.

0463 CLINICAL APPLICATION OF AMYLASE ISOENZYME ANALYSIS. (Eng.) Berk, J. E.; Fridhandler, L. (Dept. Medicine, Univ. California, Irvine, CA 92668). *Am. J. Gastroenterol.* 63(6):457-463; 1975.

0464 PANCREATIC CANCER. (Eng.) Diamond, D.; Fisher, B. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Surg. Clin. North Am.* 55(2):363-376; 1975.

See also, 0192, 0193, 0210, 0223, 0225, 0227, 0232, 0360, 0369, 0466, 0629.

PANCREAS

Pancreatitis

0465 THE PATHOGENESIS OF PULMONARY EDEMA IN ACUTE PANCREATITIS. (Eng.) Warshaw, A. L.; Lesser, P. B.; Rie, M.; Cullen, D. J. (Massachusetts General Hosp., Boston, MA 02114). *Ann. Surg.* 182(4):505-510; 1975.

A distinct form of pulmonary injury in pancreatitis characterized by acute pulmonary edema is documented. Acute pulmonary edema associated with acute pancreatitis was seen in 8% of a series of 60 unselected acute pancreatitis patients and clinical findings in 7 cases are reported. The primary identifiable etiologic factors for the pancreatitis were alcohol abuse (3 patients), type IV hyperlipoproteinemia (2), gastrectomy (1), and idiopathic (1). The diagnosis of pancreatitis was made on clinical grounds and on the basis of an elevated serum amylase, and pulmonary edema was diagnosed radiographically in patients in respiratory distress. None of the patients were in respiratory distress on admission or was there any evidence of prior pulmonary disease. In contrast, hyperlipidemia was seen in only 11% of all cases of acute pancreatitis seen during the same period. Serum calcium was below normal in 7/8 cases, and was less than 7.0 mg% in 4/8. Respiratory distress appeared

48-96 hr after admission. Central venous pressure, pulmonary artery pressure, pulmonary capillary wedge pressure, and pulmonary vascular resistance were normal during the periods of respiratory distress. Cardiac index was elevated. In all cases, respiratory treatment, consisting of endotrachial intubation and controlled ventilation with positive end-expiratory pressure, was successful in reversing injury and allowing recovery of normal respiratory function within 1-2 weeks. It is concluded that this peculiar form of pulmonary injury results from a loss of integrity of the alveolar-capillary membrane leading to pulmonary edema. The authors suggest that circulating free fatty acids, phospholipase A, or vasoactive substances may be involved. Apparently the lesion heals during intensive respiratory support.

0466 COMBINED ENDOSCOPIC PANCREATIC FLUID COLLECTION AND RETROGRADE PANCREATOGRAPHY. [Abstract]. (Eng.) Kawanishi, H.; Sell, J. E.; Pollard, H. M. (Univ. Michigan Medical Sch., Ann Arbor, MI). *Gastrointest. Endosc.* 21(4):190; 1975.

0467 DUPLICATION OF THE STOMACH COMMUNICATING WITH THE PANCREATIC DUCTS. (Fre.) Huguier, M.; Luboinski, J. (Hopital Rothschild, 43, boulevard de Picpus, F 75012, Paris, France). *Arch. Fr. Mal. App. Dig.* 64(2):153-157; 1975.

0468 GLUCAGON IN THE TREATMENT OF ACUTE PANCREATITIS. NOTE I--FIRST CLINICAL RESULTS. (Ita.) Mercati, U.; Trancanelli, V.; Natalini, G.; Furiosi, P. (Experimental Surgery Sch., Univ. Ancona, Perugia, Italy). *Minerva Chir.* 30(10):572-582; 1975.

0469 ACUTE AND CHRONIC PANCREATITIS. (Eng.) Carey, L. C. (Dept. Surgery, Ohio St. Univ., 410 W. 10th Ave., Columbus, OH 43212). *Surg. Clin. North Am.* 55(2):325-338; 1975.

0470 FATAL PANCREATITIS: A CLINICAL AND POSTMORTEM STUDY ON 24 CASES OF ACUTE PANCREATITIS WITH FATAL OUTCOME, WITH SPECIAL REFERENCE TO SOME CLINICAL ASPECTS OF AUTOPSY FINDINGS. (Eng.) Kyosola, K.; Fock, G. (Maria Hosp., Lapinlahdenkatu 16, 00180 Helsinki 18, Finland). *Ann. Chir. Gynecol. Fenn.* 64(2):91-95; 1975.

0471 CONSERVATIVE SURGERY IN ACUTE PANCREATITIS. (Eng.) Fock, G.; Kyosola, K. (Maria Hosp., Lapinlahdenkatu 16, 00180 Helsinki 18, Finland). *Ann. Chir. Gynecol. Fenn.* 64(2):83-90; 1975.

0472 CLINICAL EFFECT OF TRASYLOL AND MORPHOLOGICAL CHANGES IT CAUSED IN THE PANCREAS IN PATIENTS AND EXPERIMENTAL ANIMALS WITH ACUTE PANCREATITIS. (Rus.) Popivanov, I.; Zagurov, G. (N. I. Pirogov Medical Inst., Moscow, USSR). *Suvrem. Med.* 25(11):14-19; 1974.

0473 ACUTE PANCREATITIS. (Eng.) Graham, N. G. (Huddersfield Royal Infirmary, England). *Practitioner* 214(1284):763-775; 1975.

0474 MOTOR FUNCTION OF THE DUODENUM: CONDITION OF ITS MUCOSA AND PARIETAL DIGESTION IN PATIENTS WITH CHRONIC PANCREATITIS. (Rus.) Zhukov, N. A.; Ivanov, I. S. (No affiliation given). *Ter. Arkh.* 47(2):47-52; 1975.

0475 ACUTE HEMORRHAGIC PANCREATITIS AND PANCREATIC PSEUDOCYST IN CHILDHOOD. (Ger.) Janec, M. (Klinik der Komensky, Univ. in Bratislava/CSSR, Bratislava, Czechoslovakia). *Z. Kinderchir. Grenzgeb.* 16(3):286-293; 1975.

0476 OWN EXPERIENCES WITH SPLANCHNIC GANGLIECTOMY IN TREATMENT OF CHRONIC PANCREATITIS. (Pol.) Jesipowicz, M.; Kurylcio, L.; Karski, J.; Hendzel, T. (Z I Kliniki Chirurgii Ogolnej Instytuta Chirurgii AM w Liblinie, Poland). *Pol. Przegl. Chir.* 47(4):503-511; 1975.

0477 ACUTE HEMORRHAGIC NECROTIZING PANCREATITIS AND CHOLELITHIASIS. (Fre.) Vayre, P.; Levasseur, M. (Hopital Vaugirard, 389, rue Vaugirard, 75015 Paris, France). *Sem. Hop. Paris* 51(23):1578-1579; 1975.

See also, 0088, 0193, 0210, 0227, 0232, 0454, 0455, 0484.

LIVER AND BILIARY TRACT

0478 COMPARISON OF ALPHA$_1$ FETOPROTEIN RADIOIMMUNOASSAY METHOD AND LIVER SCANNING FOR DETECTING PRIMARY HEPATIC CELL CARCINOMA. (Eng.) Tonami, N.; Aburano, T.; Hisada, K. (Sch. Medicine, Kanazawa Univ., 13-1, Takara-Machi, Kanazawa-Shi, Japan). *Cancer* 36(2):466-470; 1975.

An α_1-fetoprotein (AFP) radioimmunoassay method was routinely used in addition to liver scintigraphy to detect a primary hepatic cell carcinoma, and the diagnostic accuracy of both methods was compared. Twenty-one of 27 cases (78%) with primary hepatic cell carcinoma showed a positive AFP titer of over 200 ng/ml. In three of these AFP-positive cases, no focal defects could be found in liver scintigraphy, although subsequently performed celiac angiography revealed hypervascular shadows. On the contrary, 22 of 27 cases (81%) represented well-defined focal defects on scintigraphy. In four of these cases with a positive scan, the result of AFP was negative. The overall diagnostic accuracy for detecting primary hepatic cell carcinoma with a combination of both methods was 93%.

0479 RADIOIMMUNOASSAY FOR SERUM THYROXINE-BINDING GLOBULIN: RESULTS IN NORMAL SUBJECTS AND IN PATIENTS WITH HEPATOCELLULAR CARCINOMA.

(Eng.) Gershengorn, M. C.; Larsen, P. R.; Robbins, J. (Natl. Inst. Arthritis, Metabolism, Digestive Diseases, Natl. Inst. Health, Bethesda, MD 20014). *J. Clin. Endocrinol. Metab.* 42(5):907-911; 1976.

Thyroxine-binding globulin (TBG) was measured by radioimmunoassay in the sera of 98 healthy donors and 19 patients with hepatocellular carcinoma. The human TBG was purified by affinity, anion-exchange, and gel filtration chromatography. The mean serum TBG concentration in the 98 euthyroid healthy donors was 1.45 ± 0.46 mg/100 ml, which is one-half that previously reported using a similar method. The mean level in females (1.66 ± 0.56) was significantly higher than that in males (1.37 ± 0.37). Comparison of the serum TBG level and the maximum binding capacity of serum TBG for thyroxine (T_4) yielded a molar ratio of 1:1 for T_4 and TBG. The mean serum TBG in the 19 patients with malignancy was 2.10 ± 1.29 mg/100 ml; however, only 2 of these patients had serum TBG levels outside the normal range. The authors conclude that elevated serum TBG is not a "tumor marker" for hepatocellular carcinoma, as was suggested in a previous study.

0480 QUANTITATIVE ASSESSMENT OF HEPATIC FUNCTION BY BREATH ANALYSIS AFTER ORAL ADMINISTRATION OF [^{14}C]AMINOPYRINE.

(Eng.) Hepner, G. W.; Vesell, E. S. (Milton S. Hershey Medical Center, Pennsylvania State Univ., Hershey, PA). *Ann. Intern. Med.* 83(5):632-638; 1975.

The hepatic metabolism rate of dimethylaminoantipyrine (aminopyrine) was assessed in 148 patients (37 with Laennec's cirrhosis, 10 with fatty liver without portal cirrhosis, 19 with hepatitis, 58 with liver cancer, and 24 with benign cholestasis) by measuring the specific activity of $^{14}CO_2$ excreted in breath samples obtained 2 hr after p.o. administration of a trace dose of [^{14}C]aminopyrine. The percentage of administered ^{14}C excreted in $^{14}CO_2$ in 2 hr was 7.0% ± 1.3% in control patients, and significantly less ($p < 0.01$) in patients with portal cirrhosis (2.6% ± 1.2%), fatty liver (4.7% ± 1.1%), hepatitis (2.6% ± 1.4%), and hepatic malignancy (3.5% ± 1.8%). In 16 of 24 subjects with cholestasis not caused by malignant disease, the mean $^{14}CO_2$ excretion was normal. The $^{14}CO_2$ excretion in patients with portal cirrhosis correlated highly with aminopyrine metabolic clearance rate ($r=0.92$), serum albumin ($r=0.75$), and retention of BSP ($r=0.73$). Abnormal $^{14}CO_2$ excretion returned to normal in patients with hepatitis, when the hepatitis resolved. The data suggest that the aminopyrine breath test is a safe, simple, qualitative, and quantitative liver function test.

0481 QUANTITATIVE LIVER IMAGING USING ^{131}ROSE BENGAL AS AN INDEX OF LIVER FUNCTION AND PROGNOSIS.

(Eng.) Gamlen, T. R.; Triger, D. R.; Ackery, D. M.; Fleming, J. S.; Grant, R. W.; Kenny, R. W.; Maciver, A. G.; Wright, R. (Southampton Univ. Hosp., Southampton, England). *Gut* 16(9):738-743; 1975.

Over a 2-yr period, 94 studies were performed on 84 patients with a variety of hepatic disorders employing a technique for quantitatively assessing hepatic function by direct measurement of liver parenchymal cell uptake of ^{131}I rose bengal (using a scintillation camera with a digital store and retrieval system). The diagnosis in each case was established by liver biopsy or laparotomy. The results were compared with the clinical, biochemical, and histological assessment of the patients. A good correlation was found between the half-time for hepatic uptake of ^{131}I rose bengal and the histological changes, as well as with clinical prognosis measured in terms of clinical improvement or deterioration to death. The rate of liver uptake was found to be a better index than the clearance of radioisotope from the blood and was superior to conventional biochemical investigations in both icteric and anicteric patients. The test was not shown to be of clinical value in discriminating between intra- and extrahepatic causes of jaundice. The authors suggest that this technique may provide a safe and sensitive method for assessing the severity of liver dysfunction and also for monitoring clinical progress, especially in situations where liver biopsy may be unreliable or hazardous.

0482 THE VALUE OF THE RADIO-ISOTOPE HEPATOGRAM IN THE JAUNDICED PATIENT.

(Eng.) Watson, A.; Bone, D. E.; Testa, H. J.; Torrance, B. (Royal Lancaster Infirmary, Lancaster, England). *Br. J. Surg.* 62(10):781-787; 1975.

^{131}I rose bengal given i.v. was employed in a noninvasive technique using a computer-linked gamma system equipped with an electronic light pen for the study of liver function in 80 jaundiced patients. Count rates were determined during hepatic uptake, and biliary excretion was recorded over the liver, biliary tract, and duodenum. Blood clearance of the isotope was simultaneously measured and from these data, the $T_{1/2}$ of uptake, the plasma retention, and the excretion quotient were determined. The results showed that by qualitative assessment of the uptake and excretory phases of the hepatogram and by determination of the excretion quotient, jaundice was classified with an 86% accuracy in cases where the diagnosis was not apparent from clinical and biochemical data. The $T_{1/2}$ of uptake correlated well with BSP retention in a nonjaundiced patient, and when applied to patients with obstructive jaundice enabled the progress of hepatocellular impairment with time and its recovery after relief of the obstruction to be studied.

0483 ^{67}GALLIUM ACCUMULATION IN HEPATIC ACTINOMYCOSIS. (Eng.) Chandarlapaty, S. K. C.; Dusol, M., Jr.; Edwards, R.; Pereiras, R., Jr.; Clark, R.; Schiff, E. R. (Veterans Admin. Hosp., 1201 N.W. 16th St., Miami, FL 33125). *Gastroenterology* 69(3):752-755; 1975.

A case of actinomycosis involving the liver that could be elucidated by ^{67}gallium citrate is reported in a 47-yr-old man. The liver scan with ^{99m}TcS colloid showed multiple areas of focal abnormalities. ^{67}Gallium citrate liver scan showed these areas to concentrate intensely. Actinomycosis may mimic the clinical picture of a malignant neoplastic process, making the differential diagnosis of ^{67}Ga-positive lesions of the liver more difficult.

0484 ELECTROPHORETIC IDENTIFICATION OF AN ISOENZYME OF AMYLASE WHICH INCREASES IN SERUM IN LIVER DISEASES. (Eng.) Warshaw, A. L.; Bellini, C. A.; Lee, K.-H. (Massachusetts General Hosp., Boston, MA 02114). *Gastroenterology* 70(4):572-576; 1976.

Isoenzymes of amylase in the sera of 72 persons (37 normal controls and 35 patients with elevated serum amylase concentrations) were studied using polyacrylamide gel electrophoresis and a direct saccharogenic assay for amylase activity. Two major peaks of amylase activity with mobilities similar to pancreatic and salivary amylases were apparent in the control sera. In 11 patients with acute pancreatitis, the area of activity corresponding with pancreatic amylases increased disproportionately. Electrophoretic patterns of amylase activity in the urine of normal subjects and patients with pancreatitis were almost identical to the respective serum patterns from the same persons. In contrast, a prominent slower-moving peak of amylase activity occurred in the serum of 8/12 patients who had hyperamylasemia associated with various liver diseases. Traces of this third peak were identifiable in one-third of normal serum specimens, but no increases in its activity were observed in any specimen from 11 patients with pancreatitis or from 12 other patients with hyperamylasemia unassociated with liver disease. The slower-moving peak was absent from the urine of patients whose serum contained it. The origin of the slower-moving serum amylase appearing in patients with liver disease was not established by these studies. The authors suggest that either the hepatic amylase liberated from damaged liver cells or the metabolism of an amylase not originating in the liver is altered as a result of liver dysfunction.

0485 ABNORMAL ERYTHROCYTE METABOLISM IN HEPATIC DISEASE. (Eng.) Smith, J. R.; Kay, N. E.; Gottlieb, A. J.; Oski, F. A. (Veterans Admin. Hosp., Irving Ave. and Univ. Place, Syracuse, NY 13210). *Blood* 46(6):955-964; 1975.

RBC metabolism was studied in 114 patients with severe hepatic disease. Heinz body formation after incubation of RBC's with acetylphenylhydrazine was significantly higher in patients than in healthy or hospitalized controls. RBC-reduced glutathione levels were lower than those of controls before and after incubation with acetylphenylhydrazine, and patients with the highest Heinz body counts had the lowest reduced glutathione levels. RBC methylene blue-stimulated hexose monophosphate (HMP) shunt metabolism and glucose recycling through the shunt were significantly lower in patients with active hepatic disease than in controls. There was no difference in resting HMP shunt activity or in resting recycling of glucose. Despite impairment of shunt metabolism, total glucose consumption was greater in the patients. Those with the lowest stimulated HMP shunt metabolism and glucose recycling had the highest Heinz body counts, lowest reduced glutathione, and highest total glucose consumption. A continuum of abnormal shunt metabolism was seen, from a mild reduction of stimulated HMP shunt activity to a severe combined decrease in both the HMP shunt and glucose recycling. Glutathione reductase, glutathione peroxidase, glucose-6-phosphate dehydrogenase, and transketolase were normal or increased. Sequential studies were done on 11 patients who had abnormal metabolic studies. Coincident with improvement of HMP shunt metabolism, the Heinz body counts became lower, reduced glutathione higher, hematocrit higher, and liver function improved. Impaired HMP shunt metabolism appears to be a common acquired RBC abnormality in patients with severe, active liver disease.

0486 LIPOPROTEIN PATTERN IN ACUTE AND CHRONIC LIVER DISEASE. (Ger.) Vogt, N.; Englhardt, A. (Medizinische Klinik der Universitat Marburg/Lahn, Marburg, Germany). *Dtsch. Med. Wochenschr.* 100(42):2156-2160, 1975.

Serum lipids were measured by lipoprotein electrophoresis in 115 patients with various forms of liver disease. There was a reduction in α-lipoproteins and an increase in β-lipoproteins, as well as a reduced separability of pre-β and β fractions in patients with acute viral hepatitis. All these changes regressed completely with healing. Similar changes were also shown in chronic liver disease and were most marked in acute liver failure. The changes were also marked in decompensated liver cirrhosis and chronic progressive hepatitis, and less marked in chronic persistent hepatitis and compensated liver cirrhosis. In patients with fatty livers there were no characteristic findings other than a slight increase in pre-β lipoproteins. The lipoprotein pattern was markedly changed in cases with tumor in the region of the gallbladder, but similar changes were also noted with tumors at other sites. Changes in electrophoretic lipoprotein pattern are, therefore, unlikely to be liver-specific.

0487 ALPHA-1-ANTITRYPSIN DEFICIENCY AND LIVER DISEASE IN ADULTS. (Eng.) Triger, D. R.; Millward-Sadler, G. H.; Czaykowski, A. A.; Trowell,

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J.; Wright, R. (Radcliffe Infirmary, Oxford, England). *Q. J. Med.* 45(178):351-372; 1976.

Clinical, biochemical, histological, and genetic studies were performed on 13 patients (aged 16-73 yr) from 12 families with liver disease and abnormal alpha-1-antitrypsin. Long-term observation of several patients suggested that the liver disease may be only slowly progressive. Death from hepatic failure was the most common outcome, but one patient developed a malignant hepatoma and two others died because of intraperitoneal hemorrhage due to ruptured cirrhotic nodules. The most useful screening test in liver disease was found to be the demonstration of PAS-positive globules in liver biopsy material, which is diagnostic when shown to be antigenically identical with alpha-1-antitrypsin by immunofluorescence or immunoperoxidase. Serum estimation of alpha-1-antitrypsin deficiency was performed by immunoelectrophoretic and immunodiffusion techniques. Both methods of estimation, however, were of limited value since wide variations in the serum values are commonly found in normal and abnormal states. Genotyping was carried out using starch gel electrophoresis and although of value in family studies, its value as a diagnostic aid was limited because of technical difficulties and also because alpha-1-antitrypsin accumulation in the liver may be found in both homozygous and heterozygous states. The authors suggest that adult liver disease associated with abnormalities in alpha-1-antitrypsin may be more common than has been reported. This condition should be systematically sought in all cases of liver disease of uncertain etiology.

0488 LIVER, LUNG AND MALIGNANT DISEASE IN HETEROZYGOUS (Pi MZ) α_1-ANTITRYPSIN DEFICIENCY. Eriksson, S.; Moestrup, T.; Hagerstrand, I. (Malmo General Hosp., Malmo, Sweden). *Acta Med. Scand.* 198(4):243-247; 1975.

The occurrence of PAS-positive, diastase-resistant, inclusion bodies in hepatocytes was used as a marker of heterozygous (Pi MZ) α_1-antitrypsin deficiency to study the frequency of lung, liver, and malignant disease in a consecutive autopsy material from 700 cases. Typical PAS-positive inclusion bodies were found in the liver in 26 (3.7%) cases. In these 26 subjects both liver (cirrhosis or fibrosis) and lung disease (emphysema) were significantly more prevalent ($p<0.001$) than among PAS-negative controls. The prevalence of malignant disease did not differ between the groups. The results are consistent with the concept that heterozygous (Pi MZ) α_1-antitrypsin deficiency predisposes to both liver and lung disease but does not influence the survival rate.

0489 THE ULTRASTRUCTURE OF HEPATOCYTES IN ALPHA-1-ANTITRYPSIN DEFICIENCY WITH THE GENOTYPE Pi$_{--}$. (Eng.) Feldmann, G.; Martin, J.-P.; Sesboue, R.; Ropartz, C.; Perelman, R.; Nathanson, M.; Seringe, P.; Benhamou, J.-P. (INSERM, Hopital Beaujon, 92110 Clichy, France). *Gut* 16(10):796-799; 1975.

The ultrastructure of the hepatocytes of a 5-yr-old girl with alpha-1-antitrypsin (AAT) deficiency with the genotype Pi$_{--}$ was studied to confirm the hypothesis that AAT aggregates (which are characteristic of AAT deficiency with the genotype PiZZ) should be absent in the AAT deficiency with genotype Pi$_{--}$. The ultrastructural appearance of the liver on light microscopy was normal and no reaction with anti-AAT antibodies labeled with peroxidase was detected by either light or electron microscopy. The normal appearance of the endoplasmic reticulum in this AAT deficiency with Pi$_{--}$ genotype is compatible with the hypothesis that in this variant, synthesis of AAT is completely, or nearly completely, absent. An alternative hypothesis is presented that an abnormal AAT is produced by the liver and secreted into the plasma, but disappears rapidly from the plasma.

0490 SYMPTOMATIC HEPATIC DISEASE IN CYSTIC FIBROSIS: INCIDENCE, COURSE, AND OUTCOME OF PORTAL SYSTEMIC SHUNTING. (Eng.) Stern, R. C.; Stevens, D. P.; Boat, T. F.; Doershuk, C. F.; Izant, R. J., Jr.; Matthews, L. W. (2103 Adelbert Road, Cleveland, OH 44106). *Gastroenterology* 70(5):645-649; 1976.

The incidence, course of hepatic disease, and outcome of systemic shunting are described for 15 of 693 patients with cystic fibrosis developing hepatic disease over an 18-yr period. In 13 patients all symptoms were secondary to portal hypertension. Ten had hypersplenism and six had variceal bleeding, including three who developed both conditions. All five patients who survived the initial episode of gastrointestinal bleeding underwent portal systemic shunting. A shunting procedure also was performed on one patient with hypersplenism but no variceal bleeding. No subsequent deterioration of intellectual function occurred in either the shunted or unshunted patients. Only one of the shunted patients showed progression of hepatic disease after surgery. These results suggest that portal systemic shunting is useful in the treatment of bleeding esophageal varices in cystic fibrosis. It is recommended that a sweat test to rule out cystic fibrosis be included in the evaluation of any teenage or young adult patient with unexplained portal hypertension.

0491 ISOLATION AND CHARACTERIZATION OF A NOVEL VITAMIN B_{12}-BINDING PROTEIN ASSOCIATED WITH HEPATOCELLULAR CARCINOMA. (Eng.) Burger, R. L.; Waxman, S.; Gilbert, H. S.; Mehlman, C. S.; Allen, R. H. (Washington Univ. Sch. Medicine, St. Louis, MO 63110). *J. Clin. Invest.* 56(5):1262-1270; 1975.

High levels of a novel vitamin B_{12}-binding protein (hepatoma B_{12}-BP), which were observed recently in plasma obtained from three adolescent patients with hepatocellular carcinoma, were isolated in homogeneous form from the plasma and pleural fluid of two of these patients using affinity chromatography with vitamin B_{12}-Sepharose. The hepatoma B_{12}-BP was determined to belong to the R-type group of B_{12}-binding proteins and was essentially indistinguishable from the recently isolated human milk and saliva R-type proteins in terms of (a) immunologic properties based on immunodiffusion and immunoprecipitation assays, (b) amino acid composition, (c) molecular weight based on amino acid and carbohydrate content, and (d) absorption spectra. Both hepatoma B_{12}-BP's contained more sialic acid and less fucose than the milk and saliva B_{12}-BP's. All four proteins contained similar amounts of galactose, mannose, galactosamine, and glucosamine. Differences in sialic acid content appeared to account for the differences in electrophoretic mobility observed among the four proteins. Differences in total carbohydrate content appeared to account for the differences in apparent molecular weight observed with both gel filtration and sodium dodecyl sulfate-polyacrylamide gel electrophoresis. Tumor tissue from one of the patients contained 10 times as much R-type protein as did normal liver tissue from the same patient. This suggests that synthesis by the tumor is the cause of high levels of R-type protein found in the plasma of certain patients with hepatocellular carcinoma. Plasma survival studies in rabbits indicated that hepatoma B_{12}-BP has a prolonged plasma survival, another important parameter.

0492 ADENOSQUAMOUS CARCINOMA OF THE LIVER.

(Eng.) Barr, R. J.; Hancock, D. E. (Veterans Admin. Hosp., Long Beach, CA 90801). *Gastroenterology* 69(6):1326-1330; 1975.

A rare case of adenosquamous carcinoma of the liver is reported. An 85-yr-old man presented with a 6-month history of weight loss and an enlarged liver. A biopsy demonstrated a squamous cell carcinoma that was presumed to be metastatic with an occult primary. At autopsy, the liver was partially replaced by a focally cystic tumor. Histologically, the neoplasm demonstrated both malignant squamous and glandular components as well as foci of transition between the two. This is in contradistinction to the five previously reported cases of primary hepatic squamous cell carcinomas or tumors containing a squamous component. It is suggested that this neoplasm arose from malignant transformation of squamous metaplasia in a preexisting cholangiocarcinoma.

0493 CONGENITAL HEPATIC FIBROSIS: ASPECTS OF DIAGNOSIS AND SURGICAL MANAGEMENT.

(Eng.) Sokhi, G. S.; Morrice, J. J.; McGee, J. O.; Blumgart, L. H. (Glasgow Royal Infirmary, Glasgow, Scotland). *Br. J. Surg.* 62(8):621-623; 1975.

Case reports were presented for five cases of congenital hepatic fibrosis who underwent portasystemic shunt for portal hypertension. Case I, a girl of 17 yr with a life-long history of hematemesis and iron-deficiency anemia presented with esophageal and fundic varices. Liver function tests were normal and a mesocaval shunt was carried out; recovery was uneventful. Case II, a woman aged 30 yr, was admitted with hematemesis and melena; there was a family history of congenital hepatic fibrosis. Splenectomy and splenorenal anastomosis were carried out after an operative portal venogram revealed a patent portal vein. A gastroenterostomy was performed 7 yr later for a duodenal ulcer. Two yr later, the patient presented with hematemesis, ascites, abnormal liver function tests, and varices of the esophagus and body of the stomach. Following mesocaval shunt the patient died from pulmonary edema and bronchopneumonia. Case III, a woman of 61 yr, had a history of hematemesis. On admission she was semicomatose with an extensive clotting defect and an intact and patent portal vein; there was no evidence of a previous portacaval shunt. Splenectomy and splenorenal shunt were performed and a liver biopsy confirmed the diagnosis of congenital hepatic fibrosis. The patient developed hypotension, acute left ventricular failure, and anuria and died 24 hr after surgery. The fourth case, an 11-yr-old boy presented with hematemesis. Laparotomy at age 22 yr showed a thrombosed portal vein. A liver biopsy demonstrated congenital hepatic fibrosis. The patient died 4 yr later and after five episodes of hematemesis and melena. The last case, a man of 29 yr, was admitted with hematemesis and hepatosplenomegaly. At laparotomy, portal pressure was 32 cm H_2O. Splenectomy and splenorenal anastomosis were performed and the liver biopsy showed congenital hepatic fibrosis. These cases illustrate a good prognosis for congenital hepatic fibrosis if there is early correction of portal hypertension.

0494 SERUM PHOSPHOLIPIDS IN BILHARZIAL HEPATIC FIBROSIS AND CHRONIC ACTIVE HEPATITIS.

(Eng.) Gabr, Y.; Mahfouz, M. (Medical Res. Inst., Alexandria Univ., Alexandria, A.R. Egypt). *Acta Biol. Med. Ger.* 34:1827-1833; 1975.

Serum phospholipid fractions were quantitated by thin layer chromatography in 33 patients with bilharzial hepatic fibrosis, 11 patients with chronic active hepatitis, and 25 normal subjects to compare changes in serum lipid pattern in bilharzial patients and patients with chronic active hepatitis. In bilharzial hepatic fibrosis, the total serum phospholipid level showed a significant drop, while in chronic active hepatitis it was significantly elevated above the normal level of the controls. In both groups of patients, the percentage of phospholipids analyzed as lecithin was significantly elevated. Sphingomyelin tended to be within the normal range of controls, while the percentages of lysolecithin and cephalin fractions were significantly decreased. The increase in the relative percentage of lecithin with the simultaneous decrease of the relative percentage of lysolecithin was referred to the decrease of the lecithin-cholesterol acyl transferase enzyme activity in the plasma of these patients. The authors suggest that the low lipid levels observed in bilharzial patients may be due to the poor condition of these patients or a reflection of decreased synthesis when liver function is impaired. Furthermore, the elevation of lecithin and sphingomyelin concentrations in chronic hepatitis may be a result of intrahepatic obstruction which may lead to biliary retention and the accumulation of phospholipids in the blood.

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0495 ESTIMATION OF HEPATIC BILIRUBIN UDP-GLUCURONYL TRANSFERASE IN PATIENTS WITH NONCIRRHOTIC PORTAL FIBROSIS AND LIVER DISEASE: SIGNIFICANCE AND LIMITATIONS.

(Eng.) Datta, D. V.; Nair, R.; Nair, C. R. (Postgraduate Inst. Medical Education Res., Chandigarh-160011, India). *Am. J. Dig. Dis.* 20(10):961-967; 1975.

Hepatic bilirubin UDP-glucuronyl transferase was assayed in percutaneous needle biopsy samples from patients with infectious hepatitis (9), postnecrotic cirrhosis (14), Gilbert's disease (3), noncirrhotic portal fibrosis (NCPF, 10), granuloma of the liver (4), extrahepatic portal vein obstruction (5), and 10 control subjects. A micromethod employing diazotized ethylanthranilate was used to estimate the enzyme content in small amounts of tissue. Patients with cirrhosis and infectious hepatitis revealed normal bilirubin transferase levels, whereas those with Gilbert's disease showed significantly low enzyme levels. Many patients with NCPF, 3/5 with extrahepatic portal vein obstruction, and all patients with granulomatous involvement of the liver demonstrated significantly low levels. This low activity was not associated with hyperbilirubinemia. The authors suggest that the low hepatic-enzyme activity in noncirrhotic portal fibrosis may be due to sparse smooth endoplasmic reticulum and emphasize that serum bilirubin may remain normal with very low hepatic-enzyme activity. Although induction of the microsomal enzyme bilirubin transferase was observed following phenobarbitone administration (180 mg twice a day for 10 days) in NCPF, this was not apparent in patients with cirrhosis, possibly due to maximal enzyme induction having been achieved by endogenous substrate. The results confirm previous findings regarding normal enzyme activity in cirrhosis and infectious hepatitis, and low enzyme activity in Gilbert's disease.

0496 THE HEPATIC LESION IN REYE'S SYNDROME.

(Eng.) Bove, K. E.; McAdams, A. J.; Partin, J. C.; Partin, J. S.; Hug, G.; Schubert, W. K. (Children's Hosp. Res. Foundation, Elland and Bethesda Ave., OH 45229). *Gastroenterology* 69(3):685-697; 1975.

The hepatic lesion in Reye's syndrome was studied by light microscopy of sequential needle biopsies from 49 patients and correlated with the onset of encephalopathy. Histochemical studies of frozen liver tissue were performed on 37 specimens from 16 patients. The onset of encephalopathy was determined from information supplied by parents. Glycogen content of hepatocytes was assessed in PAS-stained paraffin sections, and was used to categorize the severity of hepatic lesions. Mild glycogen depletion (type I) was either diffuse or exhibited slight periportal accentuation. Moderate glycogen depletion (type II) usually showed total loss in the periportal zone with considerable glycogen retention in the centrilobular region. In seven patients with severe glycogen depletion (type III) there was no trace of stainable glycogen in any region. Total glycogen depletion was never seen in cases with type I or type II lesions. Biochemical analysis of hepatic glycogen content in eight samples less than 24 hr after onset showed that two of three patients with less than 2%/mg liver wet weight (lower limit of normal) died, but all five patients with glycogen values within the normal range recovered. Glycogen replenishment occurred rapidly as patients recovered. The severity of the diffuse microvesicular steatosis was best seen in frozen sections stained for lipid content within 48 hr after onset of encephalopathy. Histochemical studies involving hydrogen or electron transport in hepatic mitochondria demonstrated that the lesion was attributable to mitochondrial injury. The authors suggest that investigation of a specific injury to the tricarboxylic acid cycle or electron transport system is warranted.

0497 FETAL PROGNOSIS IN OBSTETRIC HEPATOSIS.

(Eng.) Laatikainen, T.; Ikonen, E. (Univ. Central Hosp., Haartmaninkatu 2, 00290 Helsinki 29, Finland). *Ann. Chir. Gynaecol. Fenn.* 64(3):155-164; 1975.

Fetal prognosis was studied in 116 women with obstetric hepatosis. The fetus was monitored in 88/116 women by amnioscopy, by oxytoxin challenge test on alternate days, by estriol excretion in maternal 24-hr urine twice a week, and by estimation of the fetal biparietal diameter weekly. In 38% of the pregnancies, signs of fetal distress were found (abnormal heart rate or heart rate pattern, and/or meconium-stained amniotic fluid). These led to increased frequencies of induction of labor and of Caesarean sections as compared with an age, parity-distribution, matched control group. There was a 7.6% increase in the occurrence of twin pregnancies in the hepatosis series. There were 4 intrauterine and 8 perinatal losses of 125 infants born to hepatosis mothers. These observations demonstrate an increased risk for the fetus in pregnancies complicated by obstetric hepatosis. Amnioscopy and fetal heart rate recording during the delivery and oxytocin challenge test were found to be valuable in monitoring the fetal condition. Estriol determinations were of limited value in the predictive assessment of fetal distress in hepatosis, possibly due to impurities disturbing the determinations or to changed estrogen metabolism in cholestasis.

0498 LIVER BIOPSIES FROM PSORIATICS RELATED TO METHOTREXATE THERAPY: 1. FINDINGS IN 123 CONSECUTIVE NON-METHOTREXATE TREATED PATIENTS.

(Eng.) Nyfors, A.; Poulsen, H. (Dept. Dermatology, Finsen Inst., DK-2100 Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand. Sect. A.* 84(3):253-261; 1976.

Morphological features of liver biopsies taken from 113 patients (62 men, 61 women) with severe untreated psoriasis who were referred for methotrexate (MTX) therapy were compared with clinical data. Liver biopsies disclosed pathological histology (mainly fatty change and/or nonspecific reactive hepatitis) in 51% of these patients. The incidence of pathological liver histology did not statistically correlate with psoriasis parameters uch as duration and extent. However, statisticaly significant correlations (p<0.0001) were found etween the frequency of pathological liver histlogy and other factors such as age, obesity, and aily alcoholic intake. Comparison of liver histlogy with SGOT values at the time of liver biopsy howed that while the diagnostic specifity of his test was high (1.00), the diagnostic sensitivty was low (0.17). The authors conclude that ormal values of SGOT should not be relied upon to ndicate all types of liver pathology. Therefore, "risk index" indicating the probability of pathoogical liver histology was developed. To elucidate liver histology and particularly to rule out ibrosis and cirrhosis, a liver biopsy should be erformed in every psoriatic patient with a low core in the risk index prior to beginning MTX herapy.

499 LIVER BIOPSIES FROM PSORIATICS RELATED TO METHOTREXATE THERAPY: 2. FINDINGS EFORE AND AFTER METHOTREXATE THERAPY IN 88 PAIENTS. A BLIND STUDY.

(Eng.) Nyfors, A.; Poulen, H. (Dept. Dermatology, Finsen Inst., DK-2100 openhagen, Denmark). *Acta Pathol. Microbiol. Scand. ect. A.* 84(3):262-270; 1976.

xperiments were conducted to evaluate and compare istological findings in liver biopsy specimens rom 88 patients with severe psoriasis before and fter methotrexate (MTX) therapy, and to correlate ossible changes in liver histology with MTX therapy. MTX was given for an average of 26 months as single weekly, p.o. dose of a maximum 25 mg. The ean cumulative dose was 1733 mg (range 175-4590 ng). A statistically significant increase (p<0.0001) in the number of pathological post-MTX liver biopsies was found. Of the 88 patients, 6 developed cirrhosis and 5 others developed fibrosis during MTX therapy. There was no statistically significant correlation between the number of pathological post-MTX liver biopsy findings in the 88 patients and the cumulative dose or duration of MTX therapy or the admitted alcoholic intake during therapy. Cirrhosis and fibrosis did not develop more frequently in pathological than pre-MTX liver histologies. The liver damage appeared to be due to a multifactorial interaction of straining factors on the liver during MTX therapy. The following precautions for the treatment of psoriasis with MTX are suggested: (a) MTX therapy should be used only in disabling cases, (b) a pre-MTX liver biopsy and repeat liver biopsies at regular intervals of 6 months to 1 yr should be performed, and (c) alcohol should be prohibited, and frequent inquiries should be made about the patient's alcoholic intake.

0500 HEPATITIS AND BILIARY CIRRHOSIS IN RHEUMATOID ARTHRITIS.

(Eng.) van Berge Henegouwen, G. P.; Oomen, H. A. P. C.; Boersma, J. W.; Bronkhorst, F. B.; Brandt, K.-H. (Mayo Clinic, Mayo Foundation, Rochester, MN 55901). *Neth. J. Med.* 18(1):1-11; 1975.

Data on 13 patients with rheumatoid arthritis are presented of whom 7 had nonspecific liver lesions, 3 had chronic liver disease suggestive of primary biliary cirrhosis, and 3 had concomitant hepatic lesions. Based on combined clinical, serological, and histological data, the patients were divided into three groups. The first group included three patients showing disturbed liver function unrelated to rheumatoid arthritis: one patient had acute hepatitis and was HBAg positive; the second had extrahepatic obstruction due to gallstones in the common bile duct, and the third patient had hepatic cirrhosis, probably as a sequela to serum hepatitis 10 yr before. The second group comprised the seven patients with nonspecific hepatic lesions with liver function disturbances characterized by increased serum alkaline phosphatase and 5-nucleotidase, mostly normal serum bilirubin, and elevated SGPT (in one case). Liver function normalized in all these patients as soon as the exacerbation period of rheumatoid arthritis was ended. The last group included three patients with clinical, biochemical, and histological evidence of cholestasis. Serological and histological features were suggestive of autoimmune liver disease. The authors suggest that an early diagnosis of liver involvement in progressive rheumatoid arthritis could become indicative for a change in treatment of these patients.

0501 SPONTANEOUS RUPTURE OF THE LIVER.

(Eng.) Arnesjo, B.; Bengmark, S.; Ihse, I.; Petersson, B. G.; Tornqvist, H.; Vang, J. (Univ. Hosp., Lund, Sweden). *Acta Chir. Scand.* 141(5): 399-402; 1975.

Four cases (3 women, 1 man; aged 55-78 yr) of previously unsuspected spontaneous rupture of the liver are reported. In all these cases, pathological processes in the liver caused the rupture, i.e., primary hepatoma in three cases and a benign angiomatous tumor in one case. In one case, the diagnosis was not established until autopsy and in three cases at operation. In one of these latter cases, however, the bleeding source was not found until a second surgical exploration. The authors recommend four-quadrant puncture for the diagnosis of spontaneous liver rupture even in patients with only a slight suspicion of intra-abdominal hemorrhage. In cases with a ruptured solitary primary liver tumor, an acute liver resection might be performed. If there are multiple tumors, primary or secondary, simple hemostasis seems to be the treatment of choice.

0502 ON THE DEFECT OF SYNTHESIS [SIC] CERULOPLASMIN IN THE LIVER POLYRIBOSOMES IN WILSON'S DISEASE.

(Eng.) Gaitskhoki, V. S.; Kisselev, O. I.; Moshkov, K. A.; Puchkova, L. V.; Shavlovski, M. M.; Shulman, V. S.; Vacharlovski, V. G.; Neifakh, S. A. (Acad. Medical Sci., Leningrad, USSR). *Biochem. Genet.* 13(9/10):533-550; 1975.

The relative amount of polysome-bound nascent ceruloplasmin (CP) chains in liver biopsies obtained from three hepatolenticular degeneration (HDL, Wilson's disease) patients and non-Wilson's

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disease patients (controls) were measured to determine the possible qualitative or quantitative defects in CP synthesis at the levels of polysomes and CP messenger RNA (mRNA). Three immunochemical analyses were applied to the measurement of nascent CP contents: 1) immune precipitation of nascent (polysome-bound) and completed CP polypeptides pulse-labeled in cell-free conditions, 2) identification and quantitation of CP-synthesizing polysomes with the aid of I^{125}-labeled anti-CP antibodies, and 3) immunoadsorption of antibody-polysome complexes on CP gels. Experiments with the I^{125}-immunoglobin binding showed that human liver polysomes consisting of 10-12 monomers are engaged in CP synthesis. In the liver of Wilson's disease patients, the proportion of *in vivo* CP-synthesizing polysomes was sharply (10-20 times) decreased. The decreased amount of nascent CP chains was also demonstrated by immunochemical analysis of labeled polypeptides formed in cell-free preparations from the livers of HLD patients under the conditions of extension and/or completion of *in vivo* preinitiated chains. The lowering of CP concentration in the sera of HLD patients corresponded to the decreased relative amount of liver polysomes involved in CP synthesis. These data support earlier studies on the decrease of intracellular CP content in the liver of Wilson's disease patients. The size of CP-synthesizing polysomes in the liver of HDL patients was the same as in normal human liver, suggesting that the block of CP synthesis in these patients is not due to decreased efficiency of CP mRNA readout, but to a decreased amount of translatable CP mRNA. The underlying primary genetic defect may be localized either in the CP structural gene or in some other gene related to the control of CP synthesis.

0503 UREA SYNTHESIS AFTER ORAL PROTEIN INGESTION IN MAN. (Eng.) Rafoth, R. J.; Onstad, G. R. (Hennepin County Medical Center, Minneapolis, MN 55415). *J. Clin. Invest.* 56(5):1170-1174; 1975.

Hourly urea production and corresponding serum amino acid concentrations after the ingestion of single protein meals (60, 120, and 240 g of protein) were evaluated in 18 normal subjects and in 8 patients with liver disease to assess hepatic functional capacity. In normal subjects, the relation between urea production and serum amino acid concentration was linear; urea production (mg urea nitrogen/kg lean body mass) = 6.3 times the serum amino acid concentration (mg amino acid nitrogen/100 ml) minus 20.5 (SE of the estimate). Variation of protein intake from 50 to 150 g/day for 3 days before testing did not change this relation. The patients demonstrated impairment of urea synthesis proportional to the clinical severity of their liver disease. The results indicate, in contrast to previous studies, that within the range of serum amino acid concentration achieved, that concentration, rather than the liver's synthetic ability, was the limiting factor in urea production.

0504 HEMOBILIA FOLLOWING PERCUTANEOUS LIVER BIOPSY. (Eng.) Ball, T. J.; Mutchnik, M. G.; Cohen, G. M.; Burrell, M. (Yale-New Haven Hosp., 333 Cedar Street, New Haven, CT 06510). *Gastroenterology* 68(5):1297-1299; 1975.

A 26-yr-old male was admitted with gastrointestinal hemorrhage 1 day after being discharged with a diagnosis of sarcoidosis. A needle liver biopsy was performed for tissue diagnosis 3 days prior to admission and no apparent bleeding had occurred. A gastric aspirate on the second admission contained blood while the urine contained bilirubin; the hematocrit dropped from 39% to 29%. After transfusion (7 U of blood in the first 24 hr), selective celiac and superior mesenteric angiography failed to show bleeding. Filling defects were seen on retrograde cholangiography. Elevated SGOT, serum alkaline phosphatase, and serum bilirubin returned to normal values. The patient was free of pain after the second day. Follow-up for 9 months showed no further evidence of bleeding. The authors suggest that selective mesenteric angiography is the best diagnostic procedure for hemobilia following percutaneous liver biopsy.

0505 LAPAROSCOPY IN HEPATIC DISEASE [Abstract]. (Eng.) McCallum, R. W.; Berci, G. (Wadsworth Veterans Admin. Hosp., Los Angeles, CA). *Gastrointest. Endosc.* 21(4):191; 1975.

0506 HISTOLOGICAL CHANGES IN LIVER BIOPSIES IN DIFFERENT FORMS OF CHOLESTASIS. (Nor.) Poulsen, H. (Kommunehospital, Copenhagen, Denmark). *Tidsskr. Nor. Laegeforen.* 95(5):281-285; 1975.

0507 EXCHANGE TRANSFUSION IN HEPATIC COMA. PRESENTATION OF TWO CASES. (Spa.) Martinez, A.; Perez-Stable, M.; Torres, E. M. (Univ. de La Habana, Havana 19, Cuba). *Rev. Cubana Pediatr.* 47(1):39-44; 1975.

0508 INTRAHEPATIC LITHIASIS WITH ABSCESS. (Ita.) Verrienti, T. (Ospedale Maggiore, Bergamo, Italy). *Osp. Ital. Chir.* 27(5):233-240; 1974.

0509 MESENCHYMAL HAMARTOMA OF THE LIVER IN CHILDREN. (Eng.) Molfino, E.; Fraiman, M.; Pradhan, D. J. (Lutheran Hosp., 730 Ashburton St., Baltimore, MD 21216). *J. Abdom. Surg.* 17(788): 170-172; 1975.

0510 GLYCOPROTEINS AND THE LIVER: II. CHANGES IN SERUM GLYCOPROTEIN FRACTIONS IN FATTY LIVER. (Spa.) Leyba, C. O.; Castain, C. N.; Redondo, F. M.; Ortiz, J. V.; Guijo, P. S.; Diaz, J. P.; Rodriguez-Pinero, J. (Facultad Medicina, Sevilla, Spain). *Rev. Clin. Espanola* 134(5):437-440; 1974.

0511 SEVERE HEPATIC INSUFFICIENCY AS A SEQUELA OF SURGERY OTHER THAN THAT FOR PORTAL HYPERTENSION. (Fre.) Rettori, R.; Baur, O.; Camilleri, J. P.; Olivier, C. (Hotel-Dieu, 75004 Paris, France). *Bull. Soc. Int. Chir.* 33(3):196-206; 1974.

0512 FOCAL NODULAR HYPERPLASIA OF THE LIVER. (Ger.) Schay, V. E.; Miklos, G. (Kuzponti Allami Korhaz, Kutvolgyi ut 2-4, 1125 Budapest, Hungary). *Zentralbl. Allg. Pathol.* 119(1/2):44-48; 1975.

0513 THE STUDY OF GLYCOGEN METABOLISM IN LIVER TISSUE IN TYPE III GLYCOGEN STORAGE DISEASE. (Rus.) Chibisov, I. V.; Leontiev, A. F.; Rosenfeld, E. L. (Inst. Pediatrics, Moscow, USSR). *Vopr. Med. Khim.* 21(2):162-165; 1975.

0514 EFFECTIVE TEMPORARY HEPATIC SUPPORT IN ACUTE LIVER FAILURE [Abstract]. (Eng.) Slapak, M.; Wilkins, D. C. (Dept. Surgery, Univ. Cambridge, Cambridge, England). *Br. J. Surg.* 62(8):661-662; 1975.

0515 THE PATHOGENESIS OF CHOLESTASIS. (Eng.) Popper, H. (Mt. Sinai Sch. Medicine, New York, NY 10029). *Cincinnati J. Med.* 56(5):115-120; 1975.

0516 THE VALUE OF PERCUTANEOUS ASPIRATION BIOPSIES IN THE DIAGNOSIS OF HEPATIC NEOPLASMS. (Ser.) Libman, E.; Stojsic, S.; Novak, K. (Medical Center, Subotica, Yugoslavia). *Med. Pregl.* 28(3/4):101-106; 1975.

0517 CORRELATIONS BETWEEN CLINICAL, LABORATORY, HISTOLOGICAL, AND CYTOLOGICAL FINDINGS IN CHRONIC LIVER DISEASE. (Ser.) Stefanovic, R.; Vasilj, L.; Krstulovic, B.; Apic, R.; Rajcic, V.; Zadro, I. (Military Hosp., Zagreb, Yugoslavia). *Vojnosanit. Pregl.* 32(2):156-161; 1975.

0518 PYOGENIC LIVER ABSCESSES COMPLICATING ACUTE APPENDICITIS [Abstract]. (Eng.) Shfir, R.; Dinbar, A.; Wolfstien, I.; Tulcinsky, D. B. (Haim Sheba Medical Center, Tel Hashomer, Israel). *Harefuah* 88(2):103-104; 1974.

0519 LIVER FUNCTION IN PATIENTS WITH ICHTHYOSIS. (Rus.) Shmiglo, M. P. (Kiev Medical Inst., Kiev, USSR). *Vrach. Delo* (5):117; 1975.

0520 LIVER FUNCTION IN PATIENTS SUFFERING FROM PROLONGED TRAUMA SYNDROME. (Rus.) Turbin, B. V. (A. M. Gorki Medical Inst., Donetsk, USSR). *Klin. Med. (Mosk.)* (5):75-77; 1975.

0521 SOME LIVER FUNCTION TESTS IN NEONATAL SEPSIS. (Rus.) Iboian, S. R.; Garibian, N. I. (Yerevan Medical Inst., USSR). *Pediatriia* (5):69-70; 1975.

0522 CELLULAR IMMUNITY COMPARED TO HEPATITIS B ANTIGEN IN LIVER DISEASE. (Spa.) Martinez-Vazquez, J. M.; Guardia, J.; Vilaseca, J.; Pedreira, J.; Bacardi, R.; Tornos, J. (Departamento Medicina Interna, Universidad Autonoma, Barcelona, Spain). *Rev. Clin. Esp.* 135(6):545-551; 1975.

0523 ABNORMAL LIVER FUNCTION AND ELEVATED HEMOGLOBINS IN HEROIN ADDICTS. (Eng.) Gilbert, H. S.; Stimmel, B. (Mt. Sinai Sch. Medicine, City Univ. New York, Fifth Ave. & 100th St., New York, NY 10029). *Am. J. Gastroenterol.* 64(1):49-54; 1975.

0524 LIVER TRANSPLANTATION FOR WILSON'S DISEASE [Letter to Editor]. Beart, R. W., Jr.; Putnam, C. W.; Porter, K. A.; Starzl, T. E. (Univ. Colorado Medical Center, Denver, CO 80220). *Lancet* 2(7926):176-177; 1975.

See also, 0090, 0122, 0161, 0207, 0208, 0215, 0221, 0225, 0260, 0354, 0442, 0444, 0560, 0561, 0597, 0610, 0630, 0631, 0632, 0640, 0684, 0687, 0744, 0746, 0749, 0751.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

0525 A NEW APPROACH TO QUANTITATION OF THE VARIOUS SOURCES OF BILIRUBIN IN MAN. (Eng.) Berk, P. D.; Blaschke, T. F.; Scharschmidt, B. F.; Waggoner, J. G.; Berlin, N. I. (Digestive Diseases Branch, NIAMDD, Bldg. 10, Natl. Inst. Health, Bethesda, MD 20014). *J. Lab. Clin. Med.* 87(5):767-780; 1976.

Isotopic measurements of plasma bilirubin turnover (BRT), total RBC volume (TRCV), and RBC survival were used to estimate excess bilirubin synthesis in 26 normal volunteers and 35 patients with various hepatic and/or hematologic disorders. The quantity of bilirubin derived from RBC degradation (BR_{RBC}) was calculated from TRCV and the mean RBC life-span,

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and the difference between BRT and BR_{RBC}, designated "excess bilirubin synthesis (EBS)," was considered to represent the quantity of bilirubin derived from the processes responsible for early labeled pigment peaks. In normal volunteer subjects, EBS averaged 1.0 mg/kg/day, and accounted for 25% of daily bilirubin turnover. The results derived by this approach exceeded the range estimated from analysis of "early labeled peak" data. Further analysis of the data in terms of a simple model of bilirubin sources was compatible with the hypothesis that EBS consists of an essentially constant component, averaging 0.8 mg/kg/day, presumably derived principally from the liver, and a second component which varies with the erythropoietic rate. The authors conclude that in normal man the liver may contribute the major fraction of EBS.

0526 BILIRUBIN AND PARANITROPHENOL GLUCURONYL TRANSFERASE ACTIVITIES AND ULTRASTRUCTURAL ASPECT OF THE LIVER IN PATIENTS WITH CHRONIC HEMOLYTIC ANEMIAS.

(Eng.) Auclair, C.; Feldmann, G.; Hakim, J.; Boivin, P.; Boucherot, J.; Troube, H. (Faculte de Medecine Bichat-Beaujon, Paris VII, Hopital Beaujon 100, boulevard du General Leclerc, 92110 Clichy, France). *Biomed. Express (Paris)* 25(2):61-65; 1976.

The hepatic ultrastructure and hepatic bilirubin (Bil-GT) and paranitrophenol (PNP-GT) glucuronyl transferase activities were studied in 20 patients with chronic hemolytic anemia (HA) and in 5 with an aplastic anemia. In chronic HA, the hepatocytes of five of eight patients showed mitochondrial abnormalities in structure (paracrystalline inclusions), size (giant mitochondria), and shape (irregular mitochondria). There was a decrease of Bil-GT activity in 80% of the 20 patients with HA. No connection was observed between HA etiology and the degree of enzymatic activity decrease. No deficiency of PNP-GT was observed in HA. In chronic aplastic anemias, there was apparently no modification of either Bil-GT or PNP-GT activity. It is concluded that Bil-GT is often decreased in HA and that neither Bil-GT measurement nor the hepatic ultrastructure distinguish chronic HA from Gilbert's syndrome.

0527 PROLONGED SURVIVAL IN THREE BROTHERS WITH SEVERE TYPE 2 CRIGLER-NAJJAR SYNDROME: ULTRASTRUCTURAL AND METABOLIC STUDIES.

(Eng.) Gollan, J. L.; Huang, S. N.; Billing, B.; Sherlock, S. (Royal Free Hosp., Pond St., London, NW3 2Q3, England). *Gastroenterology* 68(6):1543-1555; 1975.

Case reports are presented for three brothers (I, II, and III aged 59, 53, and 55 yr old, resp.) with severe type 2 Crigler-Najjar syndrome and severe jaundice for over 50 yr. One other brother (48-yr-old) had been diagnosed as having Gilbert's syndrome. Phenobarbital therapy (180 mg/day for 7 weeks) in patient I produced a fall in plasma bilirubin concentration from 19.5 to 6.9 mg/100 ml. A low calorie (400 cal/day) diet in patient II produced a rise in plasma unconjugated bilirubin from 22.5 to 30 mg/100 ml. Phenobarbital therapy (180 mg/day) after restoration to normal caloric intake produced a fall in plasma bilirubin to 4.0 mg/100 ml in 14 days. Electron microscopy of pretreatment liver biopsy specimens from two of the patients showed marked hypertrophy and hyperplasia. Phenobarbital treatment produced further hypertrophy of the smooth endoplasmic reticulum and minor changes in bile canaliculi. The smooth endoplasmic reticulum appeared to be functionally hypoactive with respect to glucuronyl transferase activity. Patient III received the low calorie diet for 3 days in which time plasma bilirubin rose from 20.0 to 26.5 mg/100 ml. After addition of 1200 ml of 50% dextrose i.v. (2400 cal/day) to the 400-calorie diet, plasma bilirubin increased to 30 mg/100 ml in 3 days and returned to normal values by 5 days. Phenobarbital (180 mg/day) produced a reduction to 4.0 mg/100 ml within 14 days. Fasting and i.v. dextrose maintenance were resumed 4 weeks after beginning phenobarbital therapy. Plasma bilirubin increased from baseline to 6 mg/100 ml with the low calorie diet and was maintained with i.v. dextrose, but fell from 8.3 to 4.8 mg/100 ml within 24 hr of returning to a normal diet. These data suggest that the hyperbilirubinemia of fasting does not depend on caloric deficiency *per se*, and that either the route of caloric administration or the type of nutrient may influence the level of unconjugated hyperbilirubinemia.

0528 ABNORMAL HEPATIC TRANSPORT OF INDOCYANINE GREEN IN GILBERT'S SYNDROME.

(Eng.) Martin, J. F.; Vierling, J. M.; Wolkoff, A. W.; Scharschmidt, B. F.; Vergalla, J.; Waggoner, J. G.; Berk, P. D. (Natl. Inst. Arthritis, Metabolism, Digestive Diseases, Natl. Inst. Health, Bethesda, MD 20014). *Gastroenterology* 70(3):385-391; 1976.

The plasma fractional disappearance rate of graded doses of indocyanine green (k_{ICG}, min^{-1}) and the absolute hepatic ICG removal rate (V_{ICG}, mg/kg/min) were determined in 26 patients (21 men and 5 women) with Gilbert's syndrome (GS) and in 19 normal control volunteers following i.v. administration of dye (0.5, 2.0, 3.5, and 5.0 mg/kg). The diagnosis of GS was based on studies of radiobilirubin kinetics in all cases and on liver biopsy in 22 cases. The patients were further classified into three subgroups, based on patterns of BSP kinetics, as follows: GS I (15 patients) had normal BSP metabolism, GS II (5 patients) had a defect in BSP metabolism beyond the stage of initial hepatic uptake, and GS III (6 patients) had a defect in the initial hepatic uptake of BSP. Both k_{ICG} and V_{ICG} were significantly reduced compared to normal controls in the GS III group, but did not differ significantly from normal in the GS I and GS II groups. Michaelis-Menten analysis of the data indicated that V_{max} for ICG uptake in the GS III group (1.2 ± 0.6 mg/min/kg) was significantly reduced compared to the established normal value of 3.6 ± 0.6 mg/min/kg; ($p<0.01$). For all 26 GS patients, there was a highly significant correlation ($p<0.01$) between kICG and the fractional hepatic uptake rate for BSP. These studies confirm previous work indicating that patients with GS constitute a heterogeneous population with regard to defects in hepatic organic anion transport, some of the defects not being attributable to glucuronyl transferase deficiency.

0529 COMPARISON OF THE EFFECTIVENESS OF PHOTOTHERAPY AND EXCHANGE TRANSFUSION IN THE MANAGEMENT OF NONHEMOLYTIC NEONATAL HYPERBILIRUBINEMIA. (Eng.) Tan, K. L. (Dept. Paediatrics, Univ. Singapore, Republic Singapore). *J. Pediatr.* 87(4): 609-612, 1975.

The relative effectiveness of phototherapy and exchange transfusion for nonhemolytic neonatal hyperbilirubinemia was compared in 52 infants; 26 were given phototherapy and the other 26 (closely matched) received exchange transfusion. Although the exchange transfusion achieved an immediate reduction of bilirubin level, the "rebound" was rapid and tended to offset this reduction. The more gradual and steady effect of phototherapy resulted in a significantly lower serum bilirubin level at 1, 2, and 3 days after commencement of therapy; the rebound after phototherapy was small. Phototherapy was more effective than exchange transfusion in achieving prolonged reduction of bilirubin levels for nonhemolytic hyperbilirubinemia. With more efficient lamps delivering more energy in the desired spectrum, it seems feasible to treat hyperbilirubinemia of whatever etiology with this safer and more convenient form of therapy.

0530 FACTORS AFFECTING THE INCREASING INCIDENCE OF SEVERE NON-HAEMOLYTIC NEONATAL JAUNDICE. (Eng.) Sims, D. G.; Neligan, G. A. (Princess Mary Maternity Hosp., England). *Br. J. Obstet. Gynaecol.* 82(11):863-867; 1975.

In view of conflicting evidence about the possible causes of the increasing incidence of neonatal hyperbilirubinemia, retrospective analyses were carried out among babies born during 6 months of 1974. Preliminary analysis confirmed the overriding importance of preterm birth (before 37 weeks), but only 1 of 17 such cases could be attributed to ill-judged artificial induction of labor. For the main analysis, the incidence of 8 possibly relevant antecedent factors was compared in 46 cases of hyperbilirubinemia (unconjugated bilirubin > 15 mg/100 ml in term babies and > 13 mg/100 ml in some preterm babies) and in 92 controls matched for sex and gestational age. Induction of labor by "primary" oxytocin infusion and artificial rupture of the membranes was significantly more common in the index cases ($p<0.01$), but there was no difference in the incidence of "secondary" oxytocin, used to accelerate spontaneous labor. Evidence of uterine unresponsiveness suggests that the natural onset of labor was being anticipated by at least some days in many of the index cases and this could prevent the natural "priming" of the fetal enzyme systems. An excess of epidural analgesia in the mothers of the index cases was probably due to its association with the need for pain relief during "primary" oxytocin infusions. The higher incidence of postnatal weight loss in the index cases presumably contributes to the hyperbilirubinemia.

0531 'NON-OBSTRUCTIVE' CONJUGATED HYPERBILIRUBINAEMIA [ABSTRACT]. (Eng.) Thomas, D. W.; Pain, R. W.; Rowland, R. (Inst. Medical Veterinary Science, Adelaide, South Australia). *Aust. N.Z. J. Med.* 5(4):394-395; 1975.

0532 THE ROLE OF STEROID HORMONES IN THE PATHOGENESIS OF PHYSIOLOGICAL JAUNDICE IN NEONATES. (Rus.) Vedernikova, V. G.; Naugolnykh, E. Z. (Sverdlovsk Res. Inst. Maternal Youth Welfare, USSR). *Vopr. Okhr. Materin. Det.* 20(7):52-55; 1975.

0533 HEMOPERFUSION THROUGH ALBUMIN-CONJUGATED AGAROSE BEADS (ACAB) FOR THE TREATMENT OF NEONATAL JAUNDICE IN PREMATURE RHESUS MONKEYS. (Eng.) Scharschmidt, B. F.; Martin, J. F.; Shapiro, L. J.; Plotz, P. H.; Berk, P. D.; Gordon, J. K. (Natl. Inst. of Arthritis, Metabolism, and Digestive Diseases, Bethesda, MD 20014). *Clin. Res.* 23 (3):256A; 1975.

0534 EFFECTS OF RIFAMPICIN ON BILIRUBIN METABOLISM IN GILBERT'S SYNDROME AND IN PATIENTS WITH PORTACAVAL SHUNT [Abstract]. (Eng.) Okolicsanyi, L.; Cortelazzo, S.; Orlando, R.; Naccarato, R. (Istituto di Patologia Medica dell' Universita, Padova, Italy). *Rend. Gastroenterol.* 6(3):216; 1975.

0535 MICROSOMAL DRUG METABOLISM IN HYPERBILIRUBINEMIC SYNDROME [Abstract]. (Eng.) Ponz De Leon, M.; Benedetti, P.; Manenti, F.; Carulli, N. (Istituto di Clinica Medica dell' Universita, Modena, Italy). *Rend. Gastroenterol.* 6 (3):218; 1974.

See also, 0164, 0570.

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LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

0536 IMMUNOLOGIC STUDIES IN AMOEBIC LIVER ABSCESS. (Eng.) Ravi, V. V.; Mithal, S.; Malaviya, A. N.; Tandon, B. N. (All-India Inst. Medical Sciences, Ansari Nagar, New Delhi-110016, India). *Indian J. Med. Res.* 63(12):1732-1736; 1975.

The indirect hemagglutination (IHA) test for amebiasis was carried out in 14 patients with amebic liver abscess using sera and aspirate from abscess to determine if false-negative tests in serum can be avoided by simultaneously testing the aspirate. In addition, the cause of negative IHA test for amebiasis in patients with proven amebic liver abscess was studied by analysis of nutritional factors and serum albumin. Six of the 14 cases showed a positive reaction using aspirate, while 12 of the 14 cases were positive using serum. When positive, the titer in the aspirate was equal to or lower than the titer in the corresponding serum. Complement (C_3) levels in the serum and in the aspirate were also estimated. In all patients, the C_3 levels in the aspirate were significantly lower than those in the corresponding serum. The nutritional study, a detailed questionnaire of dietetic history, and serum albumin determination did not reveal any difference between the seronegative and -positive patients. The results demonstrate for the first time positive IHA tests in the aspirate of patients with amebic liver abscess.

0537 SERUM COBALT-ACTIVATED ACYLASE AND γ-GLUTAMYL TRANSPEPTIDASE ACTIVITIES IN TOXIC HEPATITIS. (Eng.) Szczeklik, A.; Wiernikowski, A.; Musial, J.; Wozny, E. (Copernicus Sch. Medicine, Krakow, Poland). *Gut* 16(8):626-629; 1975.

In a study of 69 patients with acute intoxication in whom liver injury was suspected, the determination of serum cobalt-activated acylase appears to by of value in the diagnosis of acute liver injury. Among 22 of 26 patients poisoned with cytotoxic amanita mushrooms, *A. phalloides* was detected in 17 and *A. pantherina* in 5. In these 26, and in 11 others poisoned with hepatotoxic chemicals, serum acylase activity was marked. The activity of the enzyme showed a positive correlation with that of serum transaminases, reached the highest levels on the patient's admission to hospital, and fell rapidly to undetectable levels in a few days. Slight acylase activity was observed in the majority of patients intoxicated with drugs or carbon monoxide but was not seen in sera of those poisoned with nonamanita mushrooms who showed no signs of liver injury. Unlike acylase, the serum activity of γ-glutamyl transpeptidase remained unchanged over the first days of acute toxic hepatitis. The authors suggest that the determination of serum cobalt-activated acylase might be of value in the diagnosis of acute liver injury.

0538 GUIDELINES FOR HISTOLOGICAL EVALUATION OF DRUG-INDUCED LIVER DAMAGE. (Ger.) Bianchi, L.; De Groote, J.; Desmet, V.; Gedigk, P.; Korb, G.; Popper, H.; Poulsen, H.; Scheuer, P. J.; Schmid, M.; Thaler, H.; Wepler, W. (Institut Pathologie, Universitat, CH-4056 Basel, Schonbeinstr. 40, Switzerland). *Dtsch. Med. Wochenschr.* 100(35):1746-1750; 1975.

0539 INFARCTION OF THE LIVER DUE TO NON-OBSTRUCTIVE LESION SECONDARY TO HEMORRHAGIC SHOCK. (Por.) Filomeno, A. P.; Moraes, W. C.; Kalil, R. K. (Medico da Unidade de Cardiologia do 1, Hosp. Distrital de Brasilia, Brasilia, DF). *Folha Med.* 69 (5):543-546; 1974.

See also, 0127, 0742.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

0540 DETECTION OF HB_sAg IN FIXED LIVER TISSUE--USE OF A MODIFIED IMMUNOFLUORESCENT TECHNIQUE AND COMPARISON WITH HISTOCHEMICAL METHODS. (Eng.) Portmann, B.; Galbraith, R. M.; Eddleston, A. L. W. F.; Zuckerman, A. J.; Williams, R. (King's Coll. Hosp., Medical Sch., Denmark Hill, London, England). *Gut* 17(1):1-9; 1976.

A modified immunofluorescent technique was used to detect hepatitis B surface antigen (HB_sAg) in formalin-fixed liver tissue. This method allowed retrospective examination of paraffin section and avoided the need to split the sample at the time of biopsy. In a series of 146 seropositive and 74 seronegative patients with a variety of liver disorders, hepatocytes positive for HB_sAg were found in only 1 of 55 patients with acute hepatitis type B, whereas larger numbers of positive cells were seen in all 22 healthy carriers of the antigen. In the 69 patients with chronic persistent or chronic aggressive hepatitis, the frequencies of positive biopsies were 86% and 85%, resp. The positive cells in these cases were, in comparison with healthy carriers of HB_sAg, much fewer in number and were scattered in random fashion throughout the lobule rather than occurring in discrete clumps or sheets. It is concluded that the variation in the intrahepatic expression of HB$_s$Ag may reflect differences in the immune response to hepatitis B viral antigens.

0541 INHIBITION OF MACROPHAGE MIGRATION IN RESPONSE TO HEPATITIS B$_S$ ANTIGEN. (Eng.)

Howlett, S. A.; McGuigan, J. E. (Univ. Florida, Coll. Medicine, Gainesville, FL 32611). *Gastroenterology* 69(4):960-964; 1975.

The macrophage inhibition test was used to detect the presence or absence of cell-mediated immunity to hepatitis B antigen (HB$_s$Ag) in 16 patients with acute viral hepatitis (11 were serologically positive and 5 serologically negative) and 15 patients with chronic aggressive hepatitis (10 serologically negative and 5 persistently serologically positive for the HB$_s$Ag). The results were compared with those obtained in 11 normal control subjects and 7 patients with other liver diseases (5 with alcoholic hepatitis and 2 with primary biliary cirrhosis). Inhibition of macrophage migration in response to purified HB$_s$Ag was demonstrated in serologically positive patients with acute viral hepatitis. Inhibition was not observed in patients serologically negative for HB$_s$Ag or in those patients with other liver diseases. Positive inhibition was observed in 2/11 control subjects. Chronic aggressive hepatitis patients, whether serologically negative or positive for HB$_s$Ag, were also found to have positive macrophage migration inhibition tests (14/15 patients). These results suggest that cell-mediated immunity against this antigen occurs concomitantly with the illness, and may be important in its pathogenesis. This is the first report of detection of macrophage inhibition in response to HB$_s$Ag in patients with acute viral hepatitis and chronic aggressive hepatitis.

0542 HEPATITIS B SURFACE ANTIGEN IN THE SERUM OF INFANTS AFTER DELIVERY FROM ASYMPTOMATIC CARRIER MOTHERS. (Eng.)

Okada, K.; Yamada, T.; Miyakawa, Y.; Mayumi, M. (Okubo Municipal Hosp., Shinjuku-ku, Tokyo, Japan). *J. Pediatr.* 87(3):360-363; 1975.

A study was undertaken to identify hepatitis B surface antigen (HBsAg) in cord blood and in later serum specimens from infants delivered of mothers who were asymptomatic carriers of HBsAg. A survey of the sera of 5,993 pregnant women in Tokyo revealed 139 asymptomatic carriers (2.3%), essentially the same as that of a control population of comparable age (2.2%). None of the 59 specimens of cord blood of their newborn infants was positive for HBsAg, according to an immune adherence hemagglutination assay. In 11 mother-child pairs in whom follow-up was possible for more than 7 months, HBsAg was detected in the sera of 8 infants within the first 6 months after birth, with antigenemia persisting throughout the observation period; antigenemia was not detected in the remaining 3. The subtype of HBsAg was identical for each mother-child pair. The antigen was detected in the sera of two of the infants after appropriate incubation periods of 123 and 133 days, resp., whereas in others it was detected as early as 5 and 13 days after delivery.

0543 'GROUND-GLASS' HEPATOCYTES. (Eng.)

Cohen, C. (South African Inst. Medical Res., Johannesburg, South Africa). *S. Afr. Med. J.* 49(34):1401-1403; 1975.

The case reports of two patients are presented in whom "ground-glass" hepatocytes were noted in hematoxylin and eosin-stained, formalin-fixed, paraffin-embedded specimens on liver biopsy. Case 1, a 25-yr-old hepatitis B antigen (HBAg)-positive woman, presented with gross, blood-stained ascites and macronodular cirrhosis. At laparotomy, her liver was firm and irregularly nodular. In focal clusters were ground-glass hepatocytes with eosinophilic, granular, glassy cytoplasm displacing the nucleus to the periphery of the cell. Brown aggregates of HBAg were seen (with orecin stain) in the cytoplasm near the nucleus of these ground-glass hepatocytes. Case 2, a 2-week-old male infant, presented with marked jaundice (total serum bilirubin was 27 mg/100 ml, 20 mg unconjugated). The patient was treated with phototherapy and 6 mg phenobarbitone/8 hr for 6 days but without response. A needle biopsy specimen of the liver was examined when the patient was 3 weeks old; there was evidence of hepatitis with scarring within the parenchyma. Diffusely distributed throughout the specimen and giving a "cobblestone" appearance were ground-glass hepatocytes with most nuclei central in situation. The cytoplasm did not stain with orecin, indicating that the ground-glass condition was drug-induced. In HBAg-positive patients, ground-glass hepatocytes are focally distributed in clusters. The nucleus is often eccentric with the ground-glass cytoplasm arranged in a peripheral rim. The cytoplasm stains dark-brown with orecin and blue with chromotrope aniline blue. Positive immunofluorescence with a fluorescein-conjugated antibody to hepatitis B surface antigen and the presence of intracisternal filaments and spheres indicate the presence of surface antigen in the proliferated smooth endoplasmic reticulum. These features are absent in drug-induced ground-glass hepatocytes. The author concludes that the modified orcein stain is useful for the demonstration of hepatitis B surface antigen in the cytoplasm of liver cells of HBAg carriers.

0544 IMMUNOLOGICAL ASPECTS OF HEPATITIS B VIRUS INFECTION. (Eng.)

Edgington, T. S.; Chisari, F. V. (Scripps Clinic Res. Foundation, 476 Prospect St., La Jolla, CA 92037). *Am. J. Med. Sci.* 270(2):213-227; 1975.

The various immunological aspects of hepatitis B virus (HBV) infection are reviewed. HBV infection of man and chimpanzees is associated with diffuse hepatocellular infection and variable manifestations of disease that may not only reflect the character of the host immune response, but also depend upon the differences in the cellular biology of this minimally cytopathic or noncytopathic agent. It

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appears that the presence of hepatocellular injury and the course of disease are related to the presence of viral antigens in hepatocytes or to the specific pattern of genome expression. HBV infection is typically associated with both humoral and cellular immune responses to viral and hepatocellular antigens. Whereas cellular effector systems may be responsible for immunologically mediated hepatocellular injury, the patterns of viral antigen synthesis and expression may be modulated by the humoral immune response. Aberration of lymphocyte function occurs during acute hepatitis type B. Thymus-derived lymphocyte function is abnormal and is associated wiht persistent humoral supression of T lymphocyte function during the development of the chronic carrier state. Extrahepatic disease appears attributable to the formation and deposition of hepatitis B surface antigen-antibody complexes. Information of the biology and immunology of HBV and other viruses was integrated into a hypothesis to explain the pathogenesis of injury and events associated with persistent infection. Hepatocellular injury and persistence of viral synthesis may be determined by the regulation of synthesis and hepatocyte surface expression of viral and cellular antigens as well as by the specificity and character of the host immune response. Termination of HBV infection is viewed as suppression of viral genone rather than eradication of infected cells. The authors conclude that although immune complex injury does occur in association with HBV infection, it is of secondary importance in regard to the frequency and severity of disease. If the humoral antibody response is of benefit to the host, the deleterious aspects of persistent immune complex formation may lie not so much in the injury produced by immune complexes as in the failure of the immune response, including humoral antibody, to adequately suppress viral synthesis, interrupt the pathogenetic processes, and promote recovery.

0545 ACUTE VIRAL HEPATITIS: A COMPARATIVE STUDY OF CLINICAL, BIOCHEMICAL, MORPHOLOGICAL AND IMMUNOLOGICAL FEATURES IN PATIENTS WITH AND WITHOUT AUSTRALIA ANTIGEN. (Eng.) Nielsen, J. O.; Faber, V.; Poulsen, H.; Christoffersen, P.; Dietrichson, O.; Elling, P.; Iversen, K.; Juhl, E.; Petersen, P. (Kommunehospitalet, Copenhagen, Denmark). *Scand. J. Infect. Dis.* 7(3):173-177; 1975.

The clinical, biochemical, histological, and serological variables of two groups of patients with acute viral hepatitis were compared; one group of 202 patients had detectable Australia (Au) antigen, while the other group (298 patients) was without antigenemia at the time of admission to hospital. Judged by both histological and biochemical criteria, the acute disease was more severe in the 202 patients with Au antigen than in the 298 patients without Au antigen. At the time of admission, the antigen-positive patients had a higher degree of liver cell damage than did the antigen-negative patients. The IgM concentration was significantly higher in the negative than in the positive group. During hospitalization, peak transaminase activity and bilirubin concentrations were significantly higher, and the lowest prothrombin values were significantly lower in the positive patients. It appears that the differences between the antigen-positive and antigen-negative groups is due more to qualitative etiological differences between the two groups than to the duration of antigenemia or the time of hospitalization. Thus, the demonstration of Au antigenemia provides not only epidemiological but also relevant clinical information.

0546 HEPATITIS B VIRUS INFECTION IN DENTISTS. (Eng.) Mosley, J. W.; Edwards, V. M.; Casey, G.; Redeker, A. G.; White, E. (John Wesley County Hosp., 2826 S. Hope St., Los Angeles, CA 90007). *N. Engl. J. Med.* 293(15):729-734; 1975.

Viral hepatitis was evaluated as a hazard in general dentistry. Of 1245 practitioners surveyed, 0.9% were positive for hepatitis B surface antigen, and 12.7% were antibody-positive. Of those who had had clinical hepatitis while studying or practicing dentistry, 43% were seropositive. The frequency of evidence for prior infection with hepatitis B virus increased uniformly with increasing years of professional experience. The proportion of seropositive dentists did not vary with geographical region of the United States or size of community. Only 10.5% recognized self-injection among patients who were drug abusers, and their infection rate was not increased. These data indicate an increased frequency of infection with hepatitis B virus among general dentists, and are compatible with relatively uniform endemicity of subtype/*ad* strains of that agent in the general population for several decades.

0547 FOODHANDLER-ASSOCIATED OUTBREAK OF HEPATITIS TYPE A: AN IMMUNE ELECTRON MICROSCOPIC STUDY. (Eng.) Dienstag, J. L.; Routenberg, J. A.; Purcell, R. H.; Hooper, R. R.; Harrison, W. O. (Natl. Insts. Health, Bldg. 7, Bethesda, MD 20014). *Ann. Intern. Med.* 83(5):647-650; 1975.

Immune electron microscopy, was used to study a foodhandler-associated outbreak of hepatitis among 136 naval recruits. In stool specimens collected during the acute phase, 27-nm viruslike hepatitis A antigen particles were seen, but only in patients with icteric hepatitis. Detection was possible in stools collected as early as 10 days before peak serum aminotransferase activity and up to the time of peak enzyme activity, but not thereafter. The immunologic similarity of these viruslike particles to those found in acute phase stools of volunteers inoculated with the MS-1 strain of hepatitis A virus was determined, and an increase in anti-HA was shown between acute and convalescent sera from 25 of the recruits. These data support the view that the MS-1 strain of hepatitis A virus is serologically related to naturally acquired type A hepatitis.

0548 ON THE ROLE OF SEXUAL BEHAVIOR IN THE SPREAD OF HEPATITIS B INFECTION. (Eng.) Szmuness, W.; Much, M. I.; Prince, A. M.; Hoofnagle, J. H.; Cherubin, C. E.; Harley, E. J.; Block, G. H.

(Lab. Epidemiology Virology, Lindsley F. Kimball Res. Inst., New York Blood Center, New York, NY). *Ann. Int. Med.* 83(4):489-495; 1975.

A retrospective study was undertaken to ascertain the role of human sexual behavior in the transmission of hepatitis B infection. Sample 1 of the population studies consisted of 238 spouses of volunteer blood donors who were found to be hepatitis B surface antigen (HB$_s$Ag)-negative (19 of the index-donors were anti-HB$_s$ positive). Sample 2 consisted of 280 spouses (87% were wives) of donors who were persistent carriers of HB$_s$Ag. Sample 3 consisted of 597 patients attending two venereal disease clinics; 272 were either under treatment for syphilis or gonorrhea or had had treatment in the past, while the remaining 325 attended clinics for screening and did not have a history of known venereal infection. Sample 4 consisted of 674 homosexuals (93% male). The frequencies of hepatitis B infections in these four samples were compared with the results of screening by laboratory assays of a random, control sample of 10,000 healthy adults from the same area. All participating persons from the four study samples, as well as a 7% systematic subsample of the 10,000 controls, were surveyed for pertinent sociodemographic and epidemiologic information by a self-administered questionnaire. Screening for HB$_s$Ag was done by radioimmune assay and reverse passive hemagglutination; positive specimens were confirmed by neutralization methods. Screening for anti-HB$_s$ was done by passive hemagglutination. Antigenic determinants were assayed by the hemagglutination inhibition method. There was a significant excess of serologic evidence of hepatitis B infection in two high-promiscuity populations: patients with venereal diseases and their unrelated sexual contacts (15-18%) and male, but not female, homosexuals (37-51%). Spouses of asymptomatic chronic carriers of antigen had a higher prevalence (26-28%) than spouses of noncarriers (10-11%). The prevalence in the former was relatively low when compared with rates seen in other relatives of carriers. The results demonstrate a strong association between serologic evidence of type B hepatitis and patterns of sexual behavior; however, whether or not transmission of hepatitis B virus occurs through vaginal intercourse could not be ascertained.

0549 FATE OF INGESTED HEPATITIS B ANTIGEN IN BLOOD-SUCKING INSECTS. (Eng.)

Newkirk, M. M.; Downe, A. E. R.; Simon, J. B. (Div. Gastroenterology, Queen's Univ., Kingston, Ontario, Canada). *Gastroenterology* 69(4):982-987; 1975.

The fate of ingested hepatitis B antigen (HB$_s$Ag) in two mosquito species (*Aedes aegypti* and *Culey tarsalis)* and two Hemiptera species (*Cimex lectularius* L. and *Rhodnius prolixus*) was compared with the rate of blood meal digestion by these insects. In both mosquito species HB$_s$Ag was detected by radioimmunoassay for only a few hours after ingestion, disappearing well before the time of blood meal digestion. Production of a protease by the mosquito midgut may have been responsible for destruction of the antigen. In contrast, in the bedbug HB$_s$Ag remained detectable throughout a 5-week testing period. Moreover, titers rose during the last week, when blood meal digestion was complete, suggesting possible replication of the antigen. At no time was antigen detected in eggs or feces of any species, but juvenile bedbugs fed HB$_s$Ag when in the fourth or fifth instar stage still contained antigen after molting. The results suggest that bedbugs may potentially be a more dangerous source of hepatitis B transmission than mosquitoes.

0550 ARTICULAR AND CUTANEOUS PRODROMAL MANIFESTATIONS OF VIRAL HEPATITIS. (Eng.)

Segool, R. A.; Lejtenyi, C.; Taussig, L. M. (Arizona Medical Center, Tucson, AZ 85724). *J. Pediatr.* 87(5):709-712; 1975.

Initial presentation with arthritis, arthralgia, and skin rash subsequent to the development of hepatitis is described in three children aged 13-16 yr. In one case, the prodromal symptoms occurred 4 weeks before biochemical or clinical evidence of hepatitis. The serum sickness-like illness tended to subside with the onset of clinically evident liver disease. Hepatitis B surface antigen was detected in the sera of two patients, but free antibody to the antigen was not demonstrable in either one. Serum complement levels were low during the prodromal phase and tended to return to normal values at the onset of extensive liver involvement. The diagnosis of viral hepatitis should be considered in children presenting with polyarthritis, polyarthralgia, and a rash of uncertain etiology.

0551 PERSISTENT HB ANTIGENEMIA: ASSOCIATED CLINICAL MANIFESTATIONS AND HEPATIC LESIONS. (Eng.)

Klatskin, G. (Dept. Internal Medicine, Yale Univ., 333 Cedar St., New Haven, CT 06510). *Am. J. Med. Sci.* 270(1):33-40; 1975.

The clinical, biochemical, and histological features in 9 asymptomatic hepatitis B surface antigen (HB$_s$ Ag) carriers, 15 patients with symptomatic HB$_s$ Ag-positive chronic active hepatitis (CAH), and 29 patients with HB$_s$ antigenemia persistent for 5 months or longer following an acute viral hepatitis attack were compared. These data were contrasted with those of 67 patients with HB$_s$ Ag-negative CAH. The findings were remarkably similar in all groups. However, young males predominated in all three HB$_s$ Ag-positive groups, whereas most HB$_s$ Ag-negative cases of CAH were in middle-aged women. In the latter group, the lesions tended to be more extensive and were more commonly accompanied by smooth muscle antibody, antinuclear antibody and lupus erythematosus cells, and extrahepatic manifestations, such as ulcerative colitis, arthritis, pleurisy and pericarditis. All nine asymptomatic HB$_s$ Ag carriers exhibited hepatic lesions indistinguishable from those of CAH. The hepatic lesions, clinical features, and laboratory findings in antigen-positive CAH may be indistinguishable from those of antigen-positive unresolved viral hepatitis. This observation is consistent with the view that HB virus plays a role in

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the pathogenesis of antigen-positive CAH. The predominance of middle-aged women among patients with antigen-negative CAH, in contrast to the predominance of young males among the antigen-positive patients, and the greater frequency of serological abnormalities and extrahepatic manifestations indicative of an altered immunological response, suggest that the HB virus is not an etiologic factor in many cases of antigen-negative CAH.

0552 HEPATITIS B ANTIGEN IN SPORADIC ACUTE VIRAL HEPATITIS. (Eng.) Anand, P. N.; Dutt, M. (Military Hosp., Jullundur, India). *Indian J. Med. Res.* 63(7):916-922, 1975.

The incidence of hepatitis B antigen (HB-Ag), duration of antigenemia, correlation of severity of disease with SGPT activity, serum bilirubin, and total morbidity were recorded for 144 cases of sporadic viral hepatitis. Hepatitis B antigen was detected by immunoelectroosmophoresis in 46 of 126 patients with acute sporadic viral hepatitis and in 12 of 18 patients with tuberculosis who developed acute viral hepatitis while undergoing treatment. The duration of antigenemia in 35 cases of acute sporadic viral hepatitis, was 4-40 days (mean 22.7 days). In two cases in the tubercular group the antigenemia persisted for 122 and 135 days. High incidence of HB-Ag in the tubercular group and persistent antigenemia in two patients of the same group, may be explained on the basis of altered immunological behavior of the hosts. There was no significant difference in the severity of the disease in the HB-Ag positive and negative group as assessed by SGPT, serum bilirubin, and total morbidity.

0553 GUILLAIN BARRE SYNDROME DURING THE PREICTERIC PHASE OF ACUTE TYPE B VIRAL HEPATITIS. (Eng.) Ng, P. L.; Powell, L. W.; Campbell, C. B. (Outram Rd. General Hosp., Singapore). *Aust. N.Z. J. Med.* 5(4):367-369; 1975.

The authors describe the case of a 54-yr-old man who presented with Guillain Barre syndrome (GBS) during the preicteric phase of acute type B viral hepatitis. The patient had an ascending paralysis of the extremities, albuminocytological dissociation in the cerebrospinal fluid, and biochemical evidence of hepatocellular damage without hyperbilirubinemia. This neurological syndrome has been described infrequently in the clinical course of viral hepatitis, but only once during the prodromal period. The authors conclude that deposition of circulating immune complexes of the hepatitis B surface antigen may be involved in the pathogenesis of GBS, since this mechanism has been implicated in the pathogenesis of arthritis, nephritis, and polyarteritis.

0554 HEPATITIS B ANTIGEN (HB$_s$Ag) AND/OR ANTIBODIES (ANTI-HB$_s$ AND ANTI-HB$_c$) IN FULMINANT HEPATITIS: PATHOGENIC AND PROGNOSTIC SIGNIFICANCE. (Eng.) Trepo, C. G.; Robert, D.; Motin, J.; Trepo, D.; Sepetjian, M.; Prince, A. M. (Laboratoire d'Hygiene Faculte de Medecine, Clinique des Maladies Infectieuses, Hopital de la Croix Rousse, Service de Reanimation, Lyon, France). *Gut* 17(1):10-13; 1976.

Hepatitis B surface antigen (HB$_s$Ag) and antibodies to both the surface and core antigens of the hepatitis B virus (anti-HB$_s$ and anti-HB$_c$) were studied in 64 consecutive cases of fulminant hepatitis to clarify the role of hepatitis B virus and of the immune response in the pathogenesis of fulminant hepatitis. HB$_s$Ag was detected by counterelectrophoresis in 23 patients but by radioimmunoassay in 38. Anti-HB$_s$ was detected by passive hemagglutination in 26, and coexisting HB$_s$Ag and anti-HB$_s$ were found in 16 cases. Using an indirect immunofluorescence technique, anti-HB$_c$ was found in all patients in whom either HB$_s$Ag or anti-HB$_s$ was present. The highest survival rate was observed in patients with no evidence of HBV infection (31.3%) and was lowest in those who had both HB$_s$Ag and anti-HB$_s$ detected simultaneously (6.2%). The prognosis of those who exhibited anti-HB$_s$ only was no better than those with HB$_s$Ag alone. In a further case, transient interruption of the asymptomatic chronic HB$_s$Ag carrier state with seroconversion to anti-HB$_s$ was associated with the development of a fulminant hepatitis syndrome. The results suggest that an unusually strong and rapid immune clearance of HB$_s$Ag may be involved in the pathogenesis of fulminant hepatitis.

0555 FULMINANT HERPES SIMPLEX HEPATITIS IN AN ADULT: REPORT OF A CASE IN RENAL TRANSPLANT RECIPIENT. (Eng.) Anuras, S.; Summers, R. (Dept. Internal Medicine, Univ. Iowa, Iowa City, IA). *Gastroenterology* 70(3):425-428; 1976.

A case of disseminated herpes simplex infection in a 31-yr-old man who was a renal transplant recipient is reported. The patient presented with a unique clinical syndrome: high fever, severe sore throat with buccal and pharyngeal ulcerations, fulminant hepatitis, thrombocytopenia, and leukopenia. The patient died from hepatic failure, disseminated intravascular coagulopathy, and upper gastrointestinal bleeding. The diagnosis was made by positive herpes simplex virus culture from the throat, and was confirmed at autopsy by typical Cowdry's type A intranuclear inclusions in hepatocytes with positive herpes simplex virus culture from the liver. Review of the literature reveals that other reported cases have had very similar clinical findings, making disseminated herpes simplex infection with fulminant hepatitis a recognizable syndrome. The authors conclude based on this case report and a literature review that disseminated herpes simplex infection with fulminant hepatitis is a recognizable syndrome.

0556 HEPATITIS B ANTIGEN, AUTO-ANTIBODIES AND LIVER DISEASE IN A HAEMODIALYSIS AND TRANSPLANTATION UNIT. (Eng.) Campion, E. C.; Wangel, A. G.; Lawrence, J. R. (Queen Elizabeth Hosp., Woodville, South Australia). *Aust. N.Z. J. Med.* 5(4):314-318, 1975.

The detection of hepatitis B antigen and antibody (HBAg and HBAb) autoantibodies and the occurrence of liver disease among members of a renal hemodialysis and transplantation unit between February 1970 and December 1972 is described. During this period, 14% of 86 patients on maintenance hemodialysis, 25% of 88 renal transplant recipients, and 5% of 75 staff members were HBAg-positive. Three of 38 family members of antigen-positive patients developed hepatitis; all were either antigen- or antibody-positive. Both immunoelectroosmophoresis and radioimmunoassay were used to detect HBAg. No additional carriers were identified among the dialysis or transplant patients by applying the more sensitive technique, although two persons with hepatitis were positive only by radioimmunoassay. None of the staff members who developed antigen-positive hepatitis died, and no one became a carrier. Dialysis patients who had icteric hepatitis also cleared the antigen from the serum. Clinical hepatitis did not occur in immunosuppressed graft recipients who were carriers of the *ay* subtype of the antigen, nor was there histological evidence of liver disease in 18 of 19 of such carriers studied. Moreover, there was no association between long term presence of the antigen and the presence of the autoantibodies characteristic of chronic active hepatitis. Rapid reduction of immunosuppression was followed by acute hepatitis in one carrier, while another, whose antigen was of the *ad* subtype, developed micronodular cirrhosis.

0557 HEPATITIS B "IMMUNE" GLOBULIN: EFFECTIVENESS IN PREVENTION OF DIALYSIS-ASSOCIATED HEPATITIS. (Eng.) Prince, A. M.; Szmuness, W.; Mann, M. K.; Vyas, G. N.; Grady, G. F.; Shapiro, F. L.; Suki, W. N.; Friedman, E. A.; Stenzel, K. H. (Natl. Heart and Lung Inst., Bldg. 31, Bethesda, MD 20014). *N. Engl. J. Med.* 293(21):1063-1067; 1975.

A randomized, double-blind, multicenter study of hepatitis prevention by immune serum globulin with high antihepatitis B surface antigen, titer ("hepatitis B immune globulin") was carried out among 318 new patients and 296 staff members of renal dialysis units. High titer globulin, 3 ml, dose repeated at 4 months, was compared with equal doses of intermediate or normal titer globulin. Among staff members, the cumulative percentages developing hepatitis or hepatitis B surface antigen or both within 8 months were 6.9, 11.7, and 11.1 in the high, intermediate, and normal titer groups, resp. The lower incidence associated with high titer globulin was not significant ($p>0.05$). However, among the patients the percentages were 7.9, 21.3, and 23.1, resp., and the lower incidence in the high titer globulin group was significant ($p<0.01$). The results suggest that repeated administration of hepatitis B immune globulin will provide a useful means of reducing the incidence of hepatitis B among patients, and possibly the staff, in renal dialysis units.

0558 CLINICAL TRIALS OF HEPATITIS B IMMUNE GLOBULIN. DEVELOPMENT OF POLICIES AND MATERIALS FOR THE 1972-1975 STUDIES SPONSORED BY THE NATIONAL HEART AND LUNG INSTITUTE. (Eng.) Surgenor, D. M. N.; Chalmers, T. C.; Conrad, M. E.; Friedewald, W. T.; Grady, G. F.; Hamilton, M.; Mosley, J. W.; Prince, A. M.; Stengle, J. M. (Natl. Heart and Lung Inst., Bethesda, MD 20014). *N. Engl. J. Med.* 293(21):1060-1062; 1975.

Protocols developed by a single policy board for four interlocking clinical trials, in which a hepatitis B "immune" globulin was studied for its ability to prevent or modify hepatitis B infections, are discussed. Plasma from persons with high titers of hepatitis B antibody was used to manufacture one lot of immune globulin sufficient for the four related studies. The trials were carried out in renal dialysis units, in medical personnel with accidental exposures to hepatitis B, in transfused patients, and in patients with fulminant hepatitis. The board developed protocols that allowed comparisons among the four studies while respecting the unique requirements of each.

0559 REVIEW OF INFECTIVITY STUDIES IN NONHUMAN PRIMATES WITH VIRUS-LIKE PARTICLES ASSOCIATED WITH MS-1 HEPATITIS. (Eng.) Maynard, J. E.; Lorenz, D.; Bradley, D. W.; Feinstone, S. M.; Krushak, D. H.; Barker, L. F.; Purcell, R. H. (Phoenix Lab., 4402 North 7th St., Phoenix, AZ 85014). *Am. J. Med. Sci.* 270(1):81-85; 1975.

Hepatitis A infectivity studies were conducted in marmoset monkeys (*Saguinus mystax*) and chimpanzees by immune electron microscopy. Marmosets inoculated with human serum containing the MS-1 strain of hepatitis A virus developed viral hepatitis (9/20 in passage 1, 8/19 in passage 2, 3/7 in passage 3, and 8/8 in passage 4). In addition, 7/7 animals with hepatitis and 2/6 without illness seroconverted to 27 nm virus-like particles isolated from stools of humans in the early acute stages of hepatitis. Similar results were observed through several marmoset subpassages, and the virus-like particles were recovered from the liver of animals in the acute phase of hepatitis. Chimpanzees inoculated with stool filtrates containing the virus-like particles developed hepatitis with concomitant excretion of the particles in early acute phase stools and subsequent development of serum antibody to the particles. These results confirm the susceptibility of the *S. mystax* subspecies to infection with MS-1 hepatitis A virus and indicate the ability of this agent to maintain pathogenicity and infectivity through several animal subpassages. The authors suggest that virus-like particles of stool filtrates constitute the virus of hepatitis A of the MS-1 prototype.

0560 HEPATITIS B VIRUS INFECTION IN CHIMPANZEES: TITRATION OF SUBTYPES. (Eng.) Barker, L. F.; Maynard, J. E.; Purcell, R. H.; Hoofnagle, J. H.; Berquist, K. R.; London, W. T.; Gerety, R. J.; Krushak, D. H. (Bureau Biologics, 8800 Rockville Pike, Bethesda, MD 20014). *J. Infect. Dis.* 132(4):451-458; 1975.

Chimpanzees (34) were inoculated i.v. with sera containing the adw, ayw, adr, or ayr subtype of hepatitis B surface antigen (HB_sAg), and the serologic events and disease manifestations are presented. Infectivity titers were established for the inocula by counterimmunoelectrophoresis, complement fixation, and radioimmunoassay. Twenty-nine animals became infected with hepatitis B virus, and in every instance the subtype of HB_sAg in the infected animal was the same as the subtype in the inoculum. The patterns of serologic events varied in the infected animals but included most of the typical patterns of serologic change seen in human cases of type B hepatitis. Mild disease, manifested by elevated concentrations of serum enzymes and changes detected by liver biopsy, occurred in 23 of the 29 infected animals. There was no correlation between HB_sAg titer and infectivity titer or between virus dose and severity of disease. A direct relation between dose of inoculated virus for the three relatively high-titered subtypes (adw, ayw, and adr) and the incubation periods before appearance of HB_sAg and SGPT elevations was observed. The results demonstrate that chimpanzees are quite sensitive to HBV infection, an important asset for their evaluation of experimental vaccines and passive immunization.

0561 HEPATITIS B_S ANTIGEN, MALARIA TITERS, AND PRIMARY LIVER CANCER IN SOUTH VIETNAM. (Eng.) Welsh, J. D.; Brown, J. D.; Arnold, K.; Mathews, H. M.; Prince, A. M. (Univ. Oklahoma Health Sci. Center, Post Office Box 26901, Oklahoma City, OK 73190). *Gastroenterology* 70(3):392-396; 1976.

Possible associations between hepatitis B surface antigen (HB_sAg) or chronic malaria and primary liver cancer in South Vietnam were investigated. A total of 306 individuals from South Vietnam were studied: 61 had a diagnosis of primary liver cancer (38 had a tissue diagnosis, and 23 had a clinical diagnosis and a positive alpha-fetoprotein), 9 had viral hepatitis, 101 were hospitalized patients (60 with various other forms of liver disease and 41 without liver disease), 94 were blood donors, 29 were drug users, and 12 were normal controls. Alphafetoprotein was present in 45 of 61 (74%) of those with a diagnosis of primary liver cancer (PLC) and in none of the other patients. Using immunoelectroosmophoresis, HB_sAg was found no more frequently in those with PLC than in the other groups studied. In contrast, using a radioimmunoassay technique HB_sAg was present 3-8 times as frequently in the PLC patients as in other subjects without viral hepatitis. There was a close relationship between the presence of alpha-fetoprotein and HB_sAg in the patients with PLC. Malaria seropositivity rates were no different in the PLC groups than the other groups. It appears that in South Vietnam PLC is associated with an increased frequency of HB_sAg.

0562 LASSA VIRUS HEPATITIS. OBSERVATIONS ON A FATAL CASE FROM THE 1972 SIERRA LEONE EPIDEMIC. (Eng.) Winn, W. C., Jr.; Monath, T. P.; Murphy, F. A.; Whitfield, S. G. (Univ. Virginia Sch. Charlottesville, VA 22903). *Arch. Pathol. Pathol.* 99(11):599-604, 1975.

A case of fatal Lassa fever in a pregnant 20-yr-old woman is described. The patient developed an acute febrile disease with tonsillar exudates and hemorrhagic manifestations. Lassa virus was isolated in cell cultures from pharyngeal secretions and pleural fluid and was identified by complement fixation. Typical arenavirus particles were observed in these infected cell cultures. In a liver biopsy specimen, diffuse hepatocellular damage and focal necroses were evident, with a spectrum of liver cell change ranging from slight vacuolization to frank lysis. The virus was frequently observed in nearby extracellular spaces and was clearly associated with hepatocytes rather than sinusoidal cells. The demonstration for the first time of Lassa virus particles in human tissue provides direct evidence that the virus is responsible for the observed pathologic changes.

0563 HEPATIC DISEASE IN ASYMPTOMATIC PARENTERAL NARCOTIC DRUG ABUSERS: A VETERANS ADMINISTRATION COLLABORATIVE STUDY. (Eng.) Seef, L. B.; Zimmerman, H. J.; Wright, E. C.; Schiff, E. R.; Kiernan, T.; Leevy, C. M.; Tamburro, C. H.; Ishak, K. G. (Veterans Admin. Hosp., South Irving St., N. W., Washington, DC 20422). *Am. J. Med. Sci.* 270(1):41-47; 1975.

A collaborative study was initiated to investigate clinically asymptomatic parenteral drug addicts for evidence of liver disease at the time of entry and during an extended evaluation period. Preliminary data from 347 patients who have completed at least 3 months of follow-up evaluation revealed that on admission, abnormal serum transaminase values were demonstrated in 50%, HB_sAg in 7%, and anti-HB_s in 59%. The frequency of these findings increased during the follow-up evaluation; only 19% remained entirely free of one or more of these abnormalities. Definable hepatologic disease (acute or chronic hepatitis, alcoholic hepatitis) developed in 46%. However, among 60 of them subjected to liver biopsy, a poor correlation was noted between the clinical and histologic diagnoses. In particular, routine liver function and immunologic tests did not discriminate between histologically detected chronic active and chronic persistent hepatitis. However, HB_sAg was present significantly more frequently in those with chronic active hepatitis. Wide variability of histologic diagnoses was seen among patients subjected to more than one biopsy, apparent progression and regression of the lesion being noted. The results demonstrate the hazard of attempting to assign a prognosis to the disease on the basis of a single liver biopsy specimen, and suggest that repeated biopsies should be mandatory for the evaluation of chronic liver disease in drug addicts.

0564 STUDIES ON THE PATHOGENESIS OF CHRONIC INFLAMMATORY LIVER DISEASES: I. MEMBRANE-FIXED IgG ON ISOLATED HEPATOCYTES FROM PATIENTS. (Eng.) Hopf, U.; Arnold, W.; Meyer Zum Buschenfelde, K. H.; Forster, E.; Bolte, J. P. (Second Dept. Internal Medicine, Univ. Mainz, Mainz, West Germany). *Clin. Exp. Immunol.* 22(1):1-8; 1975.

The presence of membrane-fixed IgG on isolated hepatocytes from patients with acute and chronic inflammatory liver diseases, and its relation to the inflammatory process and/or to serological autoimmune phenomena were investigated. Studies were performed on 46 patients with acute virus A and B hepatitis (hepatitis B surface antigen [HB_sAg]-positive, 34 patients and HB_sAg-negative, 12), 49 with chronic active hepatitis (CAH) of different stages (HB_sAg-positive, 16 and -negative, 33), 13 with chronic persistent hepatitis (CPH, all negative for HB_sAg), and 14 patients with metabolic liver diseases (fatty liver, 8 patients; alcoholic cirrhosis, 4; hemochromatosis, 1; alkylphosphate intoxication, 1). In the CAH group, 32 cases (5 HB_sAg-positive and 27 HB_sAg-negative) were under immunosuppressive therapy with azathioprine and 10 mg prednisone/day when biopsies were taken. Liver tissue was obtained by percutaneous biopsy or by laparoscopy. Determination of HB_sAg and anti-HB_sAg in serum was performed by counter-immunoelectrophoresis, by complement fixation test in an autoanalyzer system, and by radioimmunoassay. The detection of human liver specific proteins (HLP) was performed by counter-immunoelectrophoresis, using monospecific heteroimmune serum from rabbits. The antibody titer against HLP was tested by a passive hemagglutination microtechnique. Membrane-fixed IgG was demonstrated on isolated hepatocytes from biopsy material by direct immunofluorescence in 9/34 patients with acute virus B hepatitis and in 17/49 cases with CAH. Patients with acute virus A hepatitis, CPH, or metabolic liver diseases did not show this phenomenon. Cases of CAH with IgG on the hepatocytes, (HB_sAg-positive as well as HB_sAg-negative) had high inflammatory activity. Antibodies against HB_sAg were not present in any serum. Autoimmune phenomena (antibodies against smooth muscle, mitochondria, and nuclei) were only rarely demonstrable. The authors conclude that an antibody- or immune complex-mediated lymphocyte toxicity may be involved in the pathogenesis of chronic liver diseases.

0565 CHRONIC LIVER DISEASE FOLLOWING HEPATITIS A INFECTION IN A HAEMODIALYSIS UNIT [Abstract]. (Eng.) Galbraith, R. M.; Portmann, B.; Eddleston, A. L. W. F.; Williams, R.; Gower, P. E.; de Wardener, H. E. (King's College Hosp., London, S.E. 5, England). *Clin. Sci. Mol. Med.* 49(3):27-28; 1975.

0566 ELECTRON MICROSCOPIC STUDIES ON HEPATOCYTES OF ASYMPTOMATIC CARRIERS OF HEPATITIS B ANTIGEN. (Eng.) Kamimura, T.; Murayama, H.; Sasaki, H.; Ichida, F. (Dept. Internal Medicine, Niigata Univ., Niigata, Japan). *Nihon Rynsho Denshi Kenbikyo Gakkai-Shi* 7(3/4):370-371; 1974.

0567 VIRUS B HEPATITIS IN GREATER GLASGOW. (Eng.) Chaudhuri, A. K. R. (Belvidere Hosp., Glasgow, Scotland). *Scot. Med. J.* 20(3):105-108; 1975.

0568 CHANGES OF SOME INDICES OF THE ELECTROLYTIC METABOLISM IN VIRAL HEPATITIS AND OTHER DISEASES OF THE LIVER. (Rus.) Pletnev, V. M.; Lenartovich, L. S. (Dept. Infectious Diseases, Kiev Inst. Postgraduate Training Phys., Kiev, USSR). *Vrach. Delo* (1):130-133; 1975.

0569 SODIUM, POTASSIUM AND CALCIUM METABOLISM IN NON-ICTERIC AND EFFACED FORMS OF VIRAL HEPATITIS. (Rus.) Fedenko, N. N.; Dorofeyeva, R. P. (Dept. Infectious Diseases, Voroshilovgrad Med. Inst., USSR). *Vrach. Delo* (1):134-136; 1975.

0570 Ad AND Ay ANTI-AUSTRALIA ANTIBODIES IN THE PREMATURE NEWBORN AND THEIR INFLUENCE ON THE BILIRUBINIC METABOLISM. (Ita.) Vierucci, A.; Bougleux, T.; Pierro, U.; Nicotina, P. A.; Bettini, F.; Panero, C. (Clinica Pediatrica Univ. "Ospedale Mayer," Via Luca Giordano, 13-50132 Firenze, Italy). *Riv. Clin. Pediatr.* 86(2/3):102-105; 1973.

0571 ON 31 CASES OF IATROGENIC ACUTE VIRAL HEPATITIS. (Ita.) Bertaggia, A.; Meneghetti, F.; Ongaro, G.; Pornaro, E.; Bolletti, M. (Ospedale Civile, Padua, Italy). *Minerva Med.* 66 (37):1755-1756; 1975.

0572 HEPATITIS B ANTIGEN IN ACUTE VIRAL HEPATITIS. (Ser.) Grahovac-Bublik, M.; Marchiotti, S.; Vondracek, O. (Military Hosp., Zagreb, Yugoslavia). *Vojnosanit. Pregl.* 32(2):153-155; 1975.

0573 THE ACIDITY OF GASTRIC JUICE IN CHILDREN AFTER INFECTIOUS HEPATITIS. (Ser.) Stojiljkovic, J. I. (Serbian Faculty Medicine Rehabilitation, Belgrade, Yugoslavia). *Srp. Arh. Celok. Lek.* 102(12):897-900; 1974.

0574 THE SIGNIFICANCE OF BLOOD TRANSFUSIONS IN THE DEVELOPMENT OF VIRAL HEPATITIS IN A HEMODIALYSIS CENTER. (Ser.) Jeren, B.; Prejac, M.; Antos, M. (Military Hosp., Zagreb, Yugoslavia). *Vojnosanit. Pregl.* 32(2):162-163; 1975.

0575 THE FREQUENCY OF HEPATITIS B ANTIGEN (HBAg) CARRIERS IN BUDAPEST [Abstract]. (Eng.) Joo-Szabados, T.; Filonenko, A.; Kovacs, E.; Nemeth, C.; Pall, G.; Pulovits, L.; Warta, S. (Inst. Serobacteriological Production, Budapest, Hungary). *Acta. Microbiol. Acad. Sci. Hung.* 22(3):339; 1975.

0576 USE OF IMMUNOADSORBENTS PREPARED WITH GLUTARALDEHYDE FOR HEPATITIS B ANTIGEN (HBAg) PURIFICATION [Abstract]. (Eng.) Szollosy, E.; Mucsi, I.; Petheo, G.; Meszaros, E. (Public Health Station, Szeged, Hungary). *Acta Microbiol. Acad. Sci. Hung.* 22(3):337; 1975.

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0577 EFFECTS ON PLANTS OF SERA FROM PATIENTS WITH VIRAL HEPATITIS [Abstract]. (Eng.) Budai, J.; Gyorgy, K.; Szecsenyi, G.; Berta, T. K. (Lazzlo Central Hosp. Infectious Diseases, Budapest, Hungary). *Acta Microbiol. Acad. Sci. Hung.* 22(3): 338; 1975.

See also, 0495, 0506, 0535, 0616.

LIVER AND BILIARY TRACT

Chronic Hepatitis

0578 DYNAMIC STUDIES ON THE PORTAL HEMODYNAMICS BY SCINTIPHOTOSPLENOPORTOGRAPHY. STREAMLINE FLOW IN THE HUMAN PORTAL VEIN. Kashiwagi, T.; Kamada, T.; Abe, H. (Osaka Univ. Medical Sch., Osaka, Japan). *Gastroenterology* 69(6):1292-1296; 1975.

To demonstrate streamline flow in the human portal vein, the hepatic lobar distribution of splenic flow was studied in six patients without liver disease and four patients with chronic hepatitis using a new technique scintiphotosplenoportography, followed by ^{198}Au-colloid liver scintigraphy. In two patients, a $^{99m}\text{TcO}_4^-$ bolus injected into the spleen drained predominantly into the left lobe of the liver. A repeat examination in one patient revealed that the bolus was chiefly directed to the right lobe. The distribution of $^{99m}\text{TcO}_4^-$ radioactivity was the same as that observed with ^{198}Au-colloid in three patients. In the other five the predominant distribution of $^{99m}\text{TcO}_4^-$ was observed in the right lobe. In 8 of 11 studies, splenic flow was distributed either to the right or left lobe instead of diffusely to both lobes. This result suggests that flow in the human portal vein is streamline rather than turbulent.

0579 HEPATIC BLOOD FLOW WITH COLLOIDAL ^{198}Au IN THE DIAGNOSIS OF CHRONIC HEPATITIS IN CHILDREN. (Eng.) Marian, L.; Szantay, V. (First Clinic Pediatrics, Cluj, Rumania). *Nucl. Med. (Stuttg.)* 14(2):158-162; 1975.

Hepatic blood flow (HBF) was evaluated with colloidal ^{198}Au (20-25 μCi) in 25 children with chronic hepatitis (13 cases of active and 12 cases of progressive chronic hepatitis) and 15 healthy controls. In 16 cases (8 cases of active and 8 cases of progressive chronic hepatitis), hepatic scintigrams were also obtained (with colloidal ^{198}Au or ^{99m}Tc). The HBF values in the control group aged 4-10 yr, varied from 306 to 520 ml/min (mean value of 421 ± 93.8 ml/min). In controls aged 12-15 yr, the HBF values were between 704 and 1177 ml/min (mean value of 841 ± 172.8 ml/min). The mean HBF value was 298 ± 78 ml/min and 604 ± 44.2 ml/min in children with chronic active hepatitis aged 4-10 yr and 12-15 yr, resp. The mean HBF value was 199 ± 37 ml/min and 426 ± 112 ml/min in children with progressive chronic hepatitis aged 4-10 yr and 12-15 yr, resp. HBF values were significantly lower in patients with progressive chronic hepatitis than in those with active chronic hepatitis. However, HBV values in all patients were significantly lower than in the controls, suggesting the existence of intrahepatic circulatory disturbances in both active and progressive chronic hepatitis. Scintigrams in active chronic hepatitis were pathological in only 25% of the cases. The authors conclude that the determination of the HBF is valuable for the diagnosis of active nonprogressive forms of chronic hepatitis in which the scintigram is normal, the clinical signs are less characteristic, and the results of biochemical functional tests and of the histological examination of the liver are inconclusive.

0580 ABNORMALITIES OF CHEMICAL TESTS FOR COPPER METABOLISM IN CHRONIC ACTIVE LIVER DISEASE: DIFFERENTIATION FROM WILSON'S DISEASE. (Eng.) LaRusso, N. F.; Summerskill, W. H. J.; McCall, J. T. (Mayo Clinic, Foundation and Medical Sch., Rochester, MN 55901). *Gastroenterology* 70(5):653-655; 1976.

Hepatic copper concentration, 24-hr urinary copper excretion, and serum ceruloplasmin concentration were measured in 54 patients with chronic active liver disease (CALD), and the abnormal findings were compared with those that characterize Wilson's disease (WD). Twenty-four hour urinary copper excretion was increased in about 50% of the patients, was significantly higher during active disease compared to remission, and was in the WD range in approximately 10% of patients. Hepatic copper concentration was also increased in the majority of patients, generally during active disease, and it sometimes overlapped with values reported in WD. By contrast, serum ceruloplasmin levels were elevated in nearly half the CALD patients and were never below normal. The authors conclude that the chemical tests routinely used to assess copper metabolism in WD are frequently abnormal in CALD. It is suggested that because serum ceruloplasmin concentrations never fall in the WD range and are often elevated, it is the most reliable routine chemical screening test to differentiate between CALD and WD.

0581 ORCEIN POSITIVE HEPATOCELLULAR MATERIAL IN HISTOLOGICAL DIAGNOSIS OF PRIMARY BILIARY CIRRHOSIS. (Eng.) Sipponen, P.; Salaspuro, M. P.; Makkonen, H. M. (Central Lab. Pathology, Haartmaninkatu 3, 00290 Helsinki 29, Finland). *Ann. Clin. Res.* 7(4):273-277; 1975.

The value of the orcein staining method in the histological diagnosis of primary biliary cirrhosis (PBC) was studied by comparing the orcein staining in liver specimens of patients with clinically, biochemically, and immunologically typical PBC with those of patients with chronic active hepatitis (CAH). Liver biopsies from 18 patients with PBC and from 25 patients with CAH were stained by orcein after oxidation of the tissue sections with potassium permanganate. In 15 out of the 18 PBC cases, the hepatocytes, usually periportally, contained cytoplasmic stainable material. Five CAH patients contained the same material, but four of these patients were clinically atypical and showed features of the cholestatic form of CAH and features crosslinking with PBC. All patients in both groups were serologically hepatitis-B antigen negative. Orcein staining seems to be a reliable addition to histological differentiation between PBC and CAH.

0582 TRIGGER FACTORS AND HL-A ANTIGENS IN CHRONIC ACTIVE HEPATITIS. (Eng.) Lindberg, J.; Lindholm, A.; Lundin, P.; Iwarson, S. (Blood Center, Sahlgrenska Sjukhuset, Gothenburg, Sweden). *Br. Med. J.* 4(5988):77-79; 1975.

Patients (46) with chronic active hepatitis (CAH) were classified according to possible trigger factors, and the distribution of HL-A antigens and the trigger factors were correlated. HL-A antigens were determined by the lymphocytotoxicity microtechnique. The patients with histologically verified CAH were divided into three groups according to whether the CAH was virus-induced (15 cases), drug-induced (13 cases), or cryptogenic. The frequency of the HL-A antigens 1 and 8 was increased in the 18 patients with cryptogenic hepatitis, while the other groups did not differ significantly from healthy controls. Autoantibodies were often found in high titers in the drug-induced and cryptogenic groups but were infrequent in the virus-induced group. Although the results support the hypothesis that patients with HL-A types 1 and 8 are prone to develop CAH, they do not exclude the possibility that these patients develop CAH due to an impaired suppressor T-cell function.

0583 ARTHRITIS ASSOCIATED WITH CHRONIC ACTIVE HEPATITIS: COMPLEMENT ACTIVATION AND CHARACTERIZATION OF CIRCULATING IMMUNE COMPLEXES. (Eng.) Wands, J. R.; Alpert, E.; Isselbacher, K. J. (Massachusetts General Hosp., Boston, MA 02114). *Gastroenterology* 69(6):1286-1291; 1975.

Ten patients with chronic active hepatitis (CAH) were studied in an attempt to isolate, purify, and characterize ciruclating cryoprotein immune complexes. Circulating immune complexes were identified in cryoproteins isolated from serial serum samples from six CAH patients with frank arthritis or arthralgias. These immune complexes were not detectable in patients with uncomplicated CAH. Only cryoprecipitates from CAH patients with frank arthritis contained IgG, IgM, IgA (demonstrated by double diffusion in agar gel), and complement components C_3, C_4, and C_5 (assayed by counterimmunoelectrophoresis). These circulating immune complexes disappeared with resolution of arthritis. Hepatitis B surface antigen was concentrated severalfold in the cryoprotein immune complexes as compared with the serum concentration. The C_3 activator fragment of the properdin complex was found in fresh serum of all patients with arthritis but was undetectable in patients with arthralgias and uncomplicated CAH. The authors conclude that the presence of circulating complement-fixing immune complexes in patients with CAH and arthritis is associated with activation of both classical and alternate complement pathways, and suggests that they play an important role in the pathogenesis of the arthritis.

0584 HAEMOCHROMATOSIS, ACTIVE CHRONIC HEPATITIS, AND FAMILIAL IgA DEFICIENCY. (Eng.) Joske, R. A.; Traub, M. (Dept. Medicine, University of Western Australia, Perth, Australia). *Digestion* 12(1):32-38; 1975.

A case report was presented to compare the relation between hemochromatosis, active chronic hepatitis (ACH), and familial IgA deficiency. A 38-yr-old man presented with a weight loss of 13 kg over a 1-yr period that was accompanied by muscular wasting and increased skin pigmentation. The liver was enlarged 10 cm below the costal margin and the spleen was palpable. Laboratory studies and liver biopsy confirmed hemochromatosis with chemical diabetes mellitus and hepatic cirrhosis. Increases in serum bilirubin, alkaline phosphatase, and SGOT were noted. Autoantibodies (IgG) were consistently present in the serum and the antinuclear reaction was homogeneous and nucleolar. Lupus erythematosus cells were abundant. Familial studies revealed the absence of liver disease or hemochromatosis in all members and the absence of IgA in the patient's brother and niece. Venesection and 51 phlebotomies were ineffective as treatment. Prednisone (p.o., 15 mg daily) produced symptomatic relief and improvement in the biochemical abnormalities of hepatic and renal function. This case provides evidence that hemochromatosis may initiate ACH in genetically susceptible subjects.

0585 THE USE OF FRESH FROZEN PLASMA OR A CONCENTRATE OF FACTOR IX AS REPLACEMENT THERAPY BEFORE LIVER BIOPSY. (Eng.) Gazzard, B. G.; Henderson, J. M.; Williams, R. (King's Coll. Hosp. and Medical Sch., London, England). *Gut* 16(8):621-625; 1975.

The use of fresh frozen plasma or a concentrate of factor IX for the correction of a coagulation defect in 30 patients with various types of chronic liver disease and a prothrombin time prolonged for ≥ 4 sec who required needle liver biopsy were compared. Patients were given either 600 ml of fresh frozen plasma, i.v., over a 0.5-hr period followed by 300 ml 6 hr later (15 patients) or a low i.v. injection of 20 ml concentrate of clotting factors (15 patients). The prothrombin time returned to within normal limits in 7/15 patients given the concentrate and in 3 of those receiving fresh frozen plasma. Levels of factors II, IX, and X increased about 30% following concentrate administration; corresponding rises in the group given fresh frozen plasma were less due to the smaller quantity of clotting factors administered with fresh frozen plasma. The increase in factor II and IX activity/kg body weight/U of clotting factor injected was greater when fresh frozen plasma was used. In neither group was there clinical evidence of bleeding, but most of the clotting factor levels, except in factor II, before biopsy were above those normally required for hemostasis. No evidence of disseminated intravascular coagulation was found with the concentrate injection, but HBAg appeared some months later in three patients, two from the concentrate group and one from those given fresh frozen plasma. However, the conversion of these patients to HBAg positive may be unrelated to the clotting factor replacement therapy. The results demonstrate partial correction of the coagulation defect in both groups of patients without any immediate side effects attributable to these prophylactic measures. The advantage of a concentrate over fresh frozen plasma for replacement therapy is that larger quantities of clotting factors can be administered in a small volume of fluid.

0586 THE COURSE OF CHRONIC HEPATITIS. (Fre.) Buligesco, L.; Carnaru, S.; Focseneanu, V. (Fundeni Hosp., Bucharest, Rumania). *Med. Chir. Dig.* 3(5):313-318; 1974.

0587 CRST SYNDROME AND CHRONIC AGGRESSIVE HBAg-NEGATIVE HEPATITIS. (Spa.) Del Rio del Busto, A.; Vazquez Rodriguez, J. J.; Mendez, J. A.; Ordonez, A.; Garcia Diez, L.; Gimeno, F.; Cerdan, A. (Ciudad Sanitaria "La Paz," Madrid, Spain). *Rev. Clin. Esp.* 136(3):273-277; 1975.

0588 ELECTRON-MICROSCOPIC PICTURE OF CHRONIC HEPATITIS. (Pol.) Sawaryn, T.; Jonek, J.; Szymonski, K.; Grzybek, H.; Panz, B. ("DZIECKO WIEJSKIE," Instytut Pediatrii A.M. ul. Szpitalna 27/33, 60-572 Poznan, Poland). *Patol. Pol.* 26(1):29-34; 1975.

0589 CHRONIC HEPATITIS IN THE LIGHT OF MORPHOLOGIC CHANGES. (Pol.) Sawaryn, T.; Smigla, K. (41-800 Zabre, 3 Maja 13/15, Instytut Patologii, Poland). *Patol. Pol.* 26(1):17-28; 1975.

0590 CHOLESTATIC VARIANT OF CHRONIC AGGRESSIVE HEPATITIS. (Rus.) Loginov, A. S.; Magnitsky, G. S.; Speransky, M. D.; Blok, Y. E.; Gupalo, E. E. (Central Inst. Gastroenterology, Moscow, USSR). *Ter. Arkh.* 46(12):78-84; 1974.

0591 CLINICAL-STATISTICAL ANALYSIS OF A CONTROLLED THERAPEUTIC EXPERIMENT IN PATIENTS WITH CHRONIC HEPATOPATHIES. (Ita.) Ranzi, T.; Bardella, M. T. (Istituto di Clinica Medica, Univ. Milano, Via Francesco Sforza, 35, 20122 Milano, Italy). *Prog. Med. (Roma)* 31(2):95-101; 1975.

0592 IN VITRO CYTOPATHIC EFFECT OF SERUM FROM PATIENTS WITH CHRONIC AGGRESSIVE HEPATITIS (CAH) ON CELLS OF ASCITE FLUID [Abstract]. (Eng.) Paradisi, F.; Graziano, L.; De Ritis, F. (Istituto di Clinica Medica, II Facolta di Medicina dell'Universita, Napoli, Italy). *Rend. Gastroenterol.* 6(3):217; 1974.

0593 BEHAVIOUR OF THE SERUM THIRD COMPONENT OF COMPLEMENT (C'_3) AND PSEUDO-CHOLINESTERASE (PCH) IN THE COURSE OF CERTAIN CHRONIC LIVER DISEASES [Abstract]. (Eng.) Sturniolo, G. C.; Farini, R.; Meani, A.; Naccarato, R. (Istituto di Patologia Medica dell'Universita, Padova, Italy). *Rend. Gastroenterol.* 6(3):219-220; 1974.

0594 EVALUATION OF CELLULAR IMMUNE RESPONSE IN CHRONIC LIVER DISEASE BY THE ROSETTE INHIBITION TEST [Abstract]. (Eng.) Salerno, F.; Zanuso, F.; Fargion, S.; Cantaluppi, A.; Del Ninno, E.; Fiorelli, G. (Istituto di Patologia Medica dell'Universita, Milano, Italy). *Rend. Gastroenterol.* 6(3):218-219; 1974.

0595 MEASLES, RUBELLA AND LYMPHOCYTE ANTIBODIES IN CHRONIC ACTIVE HEPATITIS [Abstract]. (Eng.) Thomas, H. C.; Sanchez-Tapais, J.; Ross, M.; Jones, J. V. (Royal Free Hosp., Pond St., Hampstead, London NW3 2OG, England). *Clin. Sci. Mol. Med.* 49 (3):27p; 1975.

See also, 0486, 0494, 0506, 0540, 0551, 0563, 0564, 0607.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

0596 T ROSETTES IN ALCOHOLIC CIRRHOSIS OF THE LIVER. (Eng.) Berenyi, M. R.; Straus, B.; Avila, L. (Beth Israel Medical Center, 10 Nathan D. Perlman Pl., New York, NY 10003). *JAMA* 232(1): 44-46; 1975.

In vivo and *in vitro* correlates of cell-mediated immunity were studied in 30 patients with alcoholic liver disease and 10 healthy controls. The *in vivo* assessment of cellular immunity was performed with four dermal antigens. Among the 30 patients, the incidence of negativity to an intermediate-strength purified protein derivative was 53%; to streptokinase-streptodornase, 30%; and to *Candida albicans*, 50%. However, 77% failed to be sensitized to dinitrochlorobenzene, indicating impairment of the *in vivo* cellular response. Determination of active or spontaneous T-rosette formation with uncoated sheep RBC involved a short centrifugation and incubation time for the lymphocytes and sheep RBC. This procedure identified only that subpopulation of T-cells with a high affinity for sheep RBC. In 16 patients, blastogenesis, as measured by ^{14}C-labeled thymidine incorporation, was normal in all cases when phytohemagglutinin was added to the cell culture. In 26 patients with alcoholic liver disease, the mean number of rosette-forming cells in the peripheral blood (27.4%) was significantly less than the number in controls (36.2%). This finding suggests that the active T-rosette test is a valuable tool in determining partial alterations in cell-mediated immunity in alcoholic liver cirrhosis. Further, the authors suggest that rosette formation is a more sensitive indicator of cell-mediated immunity than phytohemagglutinin-stimulated blastogenesis in these patients.

0597 LOCALIZATION OF T AND B CELLS AND ALPHA FETOPROTEIN IN HEPATIC BIOPSIES FROM PATIENTS WITH LIVER DISEASE.

(Eng.) Husby, G.; Strickland, R. G.; Caldwell, J. L.; Williams, R. C., Jr. (Univ. New Mexico Sch. Medicine, Albuquerque, NM 87131). *J. Clin. Invest.* 56(5):1198-1209; 1975.

Peripheral blood and hepatic tissue T- and B-lymphocyte distributions, serum alpha fetoprotein (AFP) concentrations, and hepatic AFP were studied in 46 patients undergoing diagnostic percutaneous liver biopsy (26 with alcoholic liver disease, 13 with nonalcoholic hepatitis or cirrhosis, and 7 with either normal hepatic histology or minor nonspecific changes). Serum AFP was determined by radioimmunoassay and hepatic tissue AFP by indirect immunofluorescence. Peripheral blood T lymphocytes were identified by the sheep red-cell rosette technique and B lymphocytes by fluoresceinated anti-immunoglobulin antisera and immunoglobulin G (IgG) aggregates. Tissue identification of T lymphocytes was accomplished using an extensively absorbed rabbit antihuman thymocyte antiserum and indirect immunofluorescence; tissue B lymphocytes were identified using pepsin F (ab')2 fragments of rabbit IgG antibodies to human immunoglobulins. T lymphocytes predominated in hepatic lymphoid infiltrates from patients with alcoholic liver disease (91%), whereas in patients with chronic active or chronic persistent hepatitis, viral hepatitis, or cryptogenic cirrhosis, proportions of T and B lymphocytic infiltrates were similar. Hepatic tissue AFP was detected in 9 of 18 patients with alcoholic hepatitis; serum AFP was increased in only 1 of these 9. Tissue AFP was not observed in the remaining biopsy material nor were serum AFP concentrations increased. Peripheral blood T-cell numbers were significantly decreased in patients with alcoholic liver disease and in nonalcoholic hepatitis or cirrhosis. The results demonstrate a close relation between peripheral blood T-lymphocytopenia and hepatic T-cell infiltrates in patients with alcoholic liver disease; this relation is less apparent in patients with nonalcoholic hepatitis or cirrhosis.

0598 ISOLATION AND ELECTROPHORETIC STUDY ON MALLORY BODIES FROM THE LIVERS OF ALCOHOLIC CIRRHOSIS.

(Eng.) Okamura, K.; Harwood, T. R.; Yokoo, H. (Northwestern Univ. Medical Sch., Chicago, IL 60611). *Lab. Invest.* 33(2):193-199; 1975.

The isolation procedures and the results of an electrophoretic study on Mallory bodies (MB) obtained from the livers of eight subjects with alcoholic cirrhosis were described. Liver slices were homogenized with an ice-cold isolation medium (0.25 M sucrose buffered to pH 8.5), subjected to velocity sedimentation in 60% sucrose solution, and centrifuged using a two-phase polymer system with polyethylene glycol-dextran. MB were isolated in large quantity and high purity (more than 95% in some cases) and they maintained characteristic filamentous structures. Isolated MB were solubilized in 6 M guanidine hydrochloride in 10% or 1% acetic acid by sonication or in 1% sodium dodecyl sulfate with 5% 2-mercaptoethanol and 8 M urea. The solubilized MB protein produced three peaks on Sephadex G-100 chromatography and at least five intense protein bands on sodium dodecyl sulfate polyacrylamide gel electrophoresis. The fractions from control livers contained several bands that were identical with the major components of isolated MB protein. These findings suggest that MB are not homogeneous protein, but are probably complexes of various proteins, and that some components of MB are present in normal hepatocytes.

0599 ETHANOL AND GALACTOSE METABOLISM AS INFLUENCED BY 4-METHYLPYRAZOLE IN ALCOHOLICS WITH AND WITHOUT NUTRITIONAL DEFICIENCIES: PRELIMINARY REPORT OF A NEW APPROACH TO PATHOGENESIS AND TREATMENT IN ALCOHOLIC LIVER DISEASE.

(Eng.) Salaspuro, M. P.; Lindros, K. O.; Pikkarainen, P. (Second Dept. Medicine, Univ. Helsinki, Haartmaninkatu 4, 00290 Helsinki 29, Finland). *Ann. Clin. Res.* 7(4):269-272; 1975.

The ethanol elimination rate, the influence of ethanol on the galactose elimination rate, and the effect of 4-methylpyrazole (4-MP) were determined in two normal volunteers, in two alcoholics with inadequate food consumption, and in two alcoholics with adequate food consumption. 4-MP reduced ethanol elimination by 30-50% and completely removed the ethanol-induced inhibition of galactose elimination in the control subjects. Ethanol elimination was accelerated in the alcoholics with adequate nutrition, but the effect of 4-MP was comparable to that in controls. In the alcoholic subjects who reported poor nutritional intake, intermediate rates of ethanol elimination were observed, and 4-MP had almost no effect on ethanol or galactose elimination. These results suggest that alcohol abuse may result in an increased contribution to ethanol elimination by pathways other than that involving alcohol dehydro-

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genase (ADH) and that the decreased contribution from ADH, possibly potentiated by inadequate nutrition, may diminish the ethanol-induced shift in the NAD-coupled redox state. Since liver damage produced by alcohol abuse is believed to be related to changes from the normal redox state caused by ethanol, these results may explain why alcoholic liver damage is uncommon in alcoholics living on a marginal diet. Since 4-MP effectively eliminates the ethanol-induced shift in the redox state, a therapeutic trial with 4-MP in alcoholics with a high risk for liver disease is indicated.

0600 ANIMAL MODELS OF ETHANOL DEPENDENCE AND LIVER INJURY IN RATS AND BABOONS. (Eng.) Lieber, C. S.; Decarli, L. M. (Veterans Admin. Hosp., Bronx, NY 10468). *Fed. Proc.* 35(5):1232-1236; 1976.

A model for the study of ethanol-related injury in which ethanol is administered to Sprague-Dawley rats and baboons as part of a nutritionally adequate liquid diet is described. The rat diet included casein and dextrin-maltose, and 18% of the total calories as protein, 35% as fat, 11% as carbohydrate, and 36% as ethanol. The baboon liquid diet also included casein and dextrin-maltose, and 18% of the total calories as protein, as much as 50% as ethanol, and 11% as carbohydrate. With this regimen, ethanol intake was much higher than with conventional procedures. All animals gained or maintained their body weight, and liver morphology was normal in the controls. Isocaloric substitution of carbohydrate by ethanol (36% of total calories in rats and 50% in baboons) resulted in the production of fatty liver in all animals, while the baboons also developed alcoholic hepatitis and cirrhosis with increased activities of SGOT. Inebriation and manifestation of dependence on withdrawal of the diet were observed in baboons and quantitated in the rat. Chemical alterations produced by ethanol at the fatty liver stage were characterized by hyperlipemia, striking triglyceride accumulation in the liver, and enhanced activities of microsomal drug metabolizing enzymes, including the microsomal ethanol oxidizing system. The demonstration that all aspects of liver injury observed in alcoholics can be reproduced in animals by the feeding of pure ethanol with an adequate diet, indicates that ethanol itself is a cause for hepatic complications. This new model is proposed as a tool for the study of the pathogenesis and treatment of alcoholic liver injury and dependence.

0601 ULTRASTRUCTURAL FINDINGS OF THE HEPATOCYTES IN ALCOHOLIC LIVER INJURY. (Eng.) Murayama, H.; Kamimura, T.; Sasaki, H.; Ichida, F. (Niigata Univ. Sch. Medicine, Niigata, Japan). *Nihon Rynsho Denshi Kenbikyo Gakkai-Shi* 7(3-4):376-377; 1974.

0602 CYTOPLASMIC PARACRYSTALLINES IN THE HEPATOCYTES OF ALCOHOLICS. (Eng.) Nagata, A.; Takahashi, T.; Furuta, S.; Oda, M. (2nd Dept. Internal Medicine, Shinshu Univ., Matsumoto, Japan). *Nihon Rynsho Denshi Kenbikyo Gakkai-Shi* 7(3-4):374-375; 1974.

0603 ALCOHOLIC HEPATITIS WITH LEUKEMOID REACTION AND THROMBOCYTOSIS. (Eng.) Baur, H. R.; Pierach, C. A.; Dhar, G. J.; Gulmen, G. (Northwestern Hosp., 810 E. 27th St., Minneapolis, MN 55407). *Minn. Med.* 58(9):668-670; 1975.

0604 ALCOHOLIC HEPATITIS. (Fre.) Tonnel, J.; Paris, J. C.; Voiment, Y. M.; Claerbout, J. F.; Roger, J.; Pommelet, P. (C.H.U., Lille, France). *Lille Med.* 20(3):198-204; 1975.

0605 THE PROGRESSION OF ACUTE ALCOHOLIC HEPATITIS (SCLEROSING HYALIN NECROSIS OF THE LIVER): 28 PATIENTS FOLLOWED FOR 10 YEARS. (Fre.) Michel, H.; Reynolds, T. B. (Clinique Medicale A, Hopital Saint-Eloi, F 34059, Montpellier Cedex, France). *Presse Med.* 4(27):1965-1966; 1975.

0606 INDICATIONS FOR PORTACAVAL ANASTOMOSIS IN PORTAL HYPERTENSION DUE TO ALCOHOLIC CIRRHOSIS (ROLE OF PATHOLOGY). (Fre.) Visset, J.; Lenne, Y.; Mitard, D.; Le Neel, J. C.; Mousseau, M. (Clinique Chirurgicale A, Hotel-Dieu, 44 Nantes, France). *J. Chir. (Paris)* 109(2):163-176; 1975.

See also, 0155, 0485, 0607, 0622, 0701, 0726.

LIVER AND BILIARY TRACT

Cirrhosis

0607 MORPHOLOGICAL FEATURES AND PROBABLE MODE OF EVOLUTION OF CIRRHOSIS OF THE LIVER IN ADULTS IN NORTH INDIA. (Eng.) Aikat, B. K.; Ghosh, R. N.; Chhuttani, P. N.; Dutta, D. V. (Post-graduate Inst. Medical Education and Res., Chandigarh, India). *Indian J. Med. Res.* 63(12):1747-1760; 1975.

A total of 250 cases of cirrhosis, 92 from autopsy and 158 from biopsy material, were analyzed to determine the prevalence of different morphological types in North India and to determine the possible roles of alcohol, viral hepatitis, and malnutrition in its etiopathogenesis. They were classified into macronodular (60.4%), micronodular (15.6%), mixed (11.2%), and unclassified end-stage diseases (3.2%). Atrophy of the left lobe was observed in 35.3% of macronodular cirrhosis and was not observed in the micronodular type. Fatty change was observed in the majority of the micronodular cirrhosis (69.3%) and among alcoholics (80%). However, fatty metamorphosis was also present in other types of cirrhosis. Mallory's hyaline was observed most frequently in the alcoholics, but was also observed in nonalcoholic cirrhosis. A combination of steatosis, steatonecrosis, and Mallory's hyaline along with satellitosis was considered morphological evidence of alcoholic cirrhosis with alcoholic hepatitis. Chronic alcoholism was responsible for 25.2% of all cirrhoses. Significant past history of jaundice was observed in 20.4%. Chronic aggressive hepatitis as a sequel of viral hepatitis was observed in 25.9% hepatitis cases during the same period. There was no evidence to suggest any cause and effect relationship between protein calorie malnutrition and cirrhosis of the liver.

0608 DISTRIBUTION OF SERUM ZINC BETWEEN ALBUMIN AND α_2-MACROGLOBULIN IN PATIENTS WITH DECOMPENSATED HEPATIC CIRRHOSIS.

(Eng.) Schechter, P. J.; Giroux, E. L.; Schlienger, J. L.; Hoenig, V.; Sjoerdsma, A. (Centre de Recherche Merrell International, 16, rue d'Ankara, F-67000 Strasbourg, France). *Eur. J. Clin. Invest.* 6(2):147-150; 1976.

Zinc distribution in the serum of patients with decompensated alcoholic cirrhosis was studied by an improved fractionation technique for albumin-bound and α_2-macroglobulin-bound zinc. Lower concentrations of total serum zinc (540 ± 111 µg/l), and of albumin-bound serum zinc (295 ± 113 µg/l) and a higher concentration of α_2-macroglobulin-bound zinc (245 ± 69 µg/l) were found in 25 patients with decompensated hepatic cirrhosis, compared to 28 healthy subjects (835 ± 91; 679 ± 83; 156 ± 27 µg/l, resp.). Levels of total and albumin-bound zinc were significantly and positively correlated with serum albumin levels. Higher levels of α_2-macroglobulin-bound zinc were associated with higher levels of α_2-macroglobulin in these patients (2.8 ± 0.8 g/l) compared to normals (2.3 ± 0.6). Hence, not only do decompensated cirrhotics exhibit a lower serum zinc level, but a greater proportion of this zinc is associated with the tightly bound, and presumably metabolically more inert, serum fraction. This situation exaggerates the zinc deficiency state of the severe cirrhotic.

0609 STUDIES OF THE PLASMA KININ-FORMING SYSTEM IN CIRRHOSIS OF THE LIVER.

(Eng.) Lukjan, H.; Czokalo, M.; Kiersnowska, B.; Bielawiec, M. (Medical Sch., Bialystok, Poland). *Acta Hepatogastroenterol.* 22(2):89-92; 1975.

Kininogen levels and kinin and kininase activities were studied in the plasma of 15 patients (4 women and 11 men aged 29-67 yr) with cirrhosis of the liver and in 21 healthy controls (14 women and 7 men aged 25-45 yr). The kininogen content was determined by the trypsin and acetone techniques and by means of the plasma and glandular kallikrein preparation. An increase in kininase activity and a lowered kininogen level were found in the patients. The maximal decrease in the kininogen level, determined by means of the plasma kallikreins, was substantiated in connection with the increased fibrinolytic activity of the plasma of the patients with hepatic cirrhosis.

0610 THE FORMATION OF BILE ACIDS IN PATIENTS WITH PORTAL LIVER CIRRHOSIS.

(Eng.) Einarsson, K.; Hellstrom, K.; Schersten, T. (Dept. Medicine, Serafimerlasarettet, Stockholm, Sweden). *Scand. J. Gastroenterol.* 10(3):299-304; 1975.

Bile acid kinetics were characterized in eight patients with portal liver cirrhosis using 24-^{14}C-cholic acid and randomly ^{3}H-labeled chenodeoxycholic acid. Although not significant on a statistical basis, the pool size, synthesis, and fractional turnover of cholic acid in the cirrhotic patients was smaller than in normolipidemic controls without evidence of liver disease. The most significant findings were the subnormal cholic acid: chenodeoxycholic acid ratio of both bile acid pool size and synthesis and the low concentrations of deoxycholic acid in duodenal bile specimens.

0611 ESTROGEN METABOLISM IN HYPERTHYROIDISM AND IN CIRRHOSIS OF THE LIVER.

(Eng.) Olivo, J.; Gordon, G. G.; Raffi, F.; Southren, A. L. (New York Medical Coll., 1249 Fifth Ave., New York, NY 10029). *Steroids* 26(1):47-56; 1975.

Estrogen metabolism was studied in spontaneous hyperthyroidism (Graves disease) and in alcoholic cirrhosis of the liver. The study employed three normal men and one woman as controls, four men and five women with hyperthyroidism, and seven men with cirrhosis. 6,7-^{3}H-estradiol-17β was infused (10 mCi primary dose followed by a constant infusion of 20 mCi) and plasma specimens were collected 135, 150, and 165 min after the primary dose. Estrone (E_1) and estradiol-17β (E_2) were separated by Sephadex LH 20 chromatography. The plasma concentration of E_2 was increased in men with hyperthyroidism. Although the metabolic clearance rate of E_2 was reduced, the production rate was increased above normal. In women with hyperthyroidism, the metabolic clearance rate of E_2 was also decreased, while the plasma clearance and production rates were similar to those of normal subjects. The conversion ratio of E_2 was increased in both hyperthyroid men and women. The plasma clearance of E_2 was significantly increased in men with cirrhosis; the metabolic clearance rate was normal and resulted in an increase in the production rate of E_2. The plasma concentration of E_1 was elevated in men with either disorder. The results demonstrate elevated plasma levels of E_1 and E_2 in hyperthyroidism and cirrhosis resulting from an overproduction of the estrogen. The diverse effects of hyperthyroidism and cirrhosis on estrogen metabolism may be related to differences in either the absolute level of binding protein or to the intrinsic disease process.

0612 SHUNT OPERATIONS FOR PORTAL HYPERTENSION. (Eng.) Hermann, R. E. (Cleveland Clinic Foundation, 9500 Euclid Ave., Cleveland, OH 44106). *Surg. Clin. North Am.* 55(5):1073-1087; 1975.

A variety of portal systemic shunts for decompression of portal hypertension are described and compared: end-to-end (EE) portacaval shunt, side-to-side (SS) portacaval shunt, splenorenal (SR) shunt, the mesenteric-caval (MC) shunt, and the selective distal splenorenal (DSR) shunt. Patients must be carefully selected for shunt operations; in unselected patients with poor liver function, the mortality rate could be excessively high (50%). The ideal patient for a portal systemic shunt is under 60 yr of age with good liver function, macronodular cirrhosis, and a large portal, superior mesenteric, or splenic vein. The shunt can be performed in 2-4 hr, provides excellent decompression of portal hypertension, has a low incidence of thrombosis, and protects against recurrent hemorrhage from varices. However, it is associated with a high incidence of postshunt encephalopathy (24%). The SS portacaval shunt is more difficult to perform than the ES, requiring greater mobilization of the inferior vena cava and portal vein. The principal advantage of this shunt is that it decompresses the portal vein leading from the liver, providing outflow of portal blood away from the liver. It is the preferred shunt for patients with intractable ascites and in patients in whom reversal of flow in the portal venous system has been demonstrated. The SR portacaval shunt has a high incidence of shunt thrombosis and rebleeding from varices (20-25% of patients); however, there is a low incidence of postshunt encephalopathy. The MC shunt, "H" type, is effective in decompressing portal hypertension and may be used for patients with intractable ascites. Its disadvantages are similar to those of SS portacaval shunts. The DSR shunt leaves the superior mesenteric flow intact to the liver, and selectively decompresses the esophageal and gastric varices through the short gastric vessel, the intact spleen, and the distal splenic vein into the left renal vein. A low incidence of encephalopathy results from this procedure, but the surgery is difficult and may result in an extremely high incidence of postshunt thrombosis. This shunt cannot be used in patients with ascites. At the present time, no one shunt has proven superior in decompressing portal hypertension.

0613 BUMETANIDE IN THE TREATMENT OF HEPATIC ASCITES. (Eng.) Ring-Larsen, H. (Rigshospitalet, Univ. Hosp., Copenhagen, 2100, Denmark). *Postgrad. Med. J.* 51(Suppl. 6):77-81; 1975.

The effectiveness of bumetanide in the treatment of liver cirrhosis was determined in a short-term study, and its effects on electrolyte status and its possible toxicity were examined in a long-term study. Bumetanide was administered p.o. to 10 patients with hepatic cirrhosis and ascites. A striking diuresis and natriuresis was produced by doses of 1-6 mg daily. Potassium supplementation ($\leq$ 60 mEq daily) was required to prevent potassium depletion but otherwise there were only minor changes in serum electrolytes. There was no adverse effect on liver function. Apart from the development of Stevens-Johnson dermatitis in one patient, there were no adverse reactions to bumetanide in the treatment of liver cirrhosis.

0614 THE RECTAL ADMINISTRATION OF LACTULOSE. (Eng.) Ratnaike, R. N.; Hicks, E. P.; Hislop, I. G. (Queen Elizabeth Hosp., Woodville, South Australia 5011). *Aust. N.Z. J. Med.* 5(26): 137-140; 1975.

The effects of rectally administered lactulose upon venous ammonia levels and the electroencephalograph were studied. A lactulose colonic washout (pH 4.5) was administered to six men with portal systemic encephalopathy. Estimation of blood ammonia levels and electroencephalography were performed before and after each treatment. Five patients recorded a significant fall in blood ammonia level as a result of lactulose therapy. In the sixth subject, an enema with buffered physiological saline, pH 4.5, induced a fall in ammonia, which was not increased by subsequent lactulose solution. Improvement in the electroencephalogram was recorded in all periods where a lactulose colonic washout produced a fall in blood ammonia level. The results support the hypothesis that pH may influence intracolonic ammonia metabolism.

0615 UPPER GASTROINTESTINAL BLEEDING IN CIRRHOSIS: CLINICAL AND ENDOSCOPIC CORRELATIONS. (Eng.) Teres, J.; Bordas, J. M.; Bru, C.; Diaz, F.; Bruguera, M.; Rodes, J. (Hospital Clinico y Provincial, Univ. Barcelona, Barcelona, Spain). *Gut* 17(1):37-40; 1976.

The authors examined the clinical data of 180 episodes of upper gastrointestinal bleeding in 168 patients with cirrhosis of the liver. The source of bleeding was determined by early endoscopy in all cases. In men under the age of 50 yr and without symptoms of liver failure, bleeding was due to ruptured gastroesophageal varices in 84% of cases. Severe liver failure was associated with acute lesions of gastric mucosa in many cases. No presumptive diagnosis of the source of hemorrhage could be based on the examination of other clinical data (presence of ascites, mode of presentation and pattern of bleeding, history of ulcer disease, alcoholism, and previous medication). The results indicate that clinical data are not reliable in localizing the source of bleeding in upper gastrointestinal hemorrhage.

0616 HB-Ag IN LIVER CIRRHOSIS: A PRELIMINARY REPORT ON CLINICAL, BIOCHEMICAL AND HISTOLOGICAL FINDINGS [Abstract]. (Eng.) Piccinino, F.; Sagnelli, A.; Andreanna, A.; Mascarella, G.; Ambroso, P. (Clinica delle Malattie Infettive, I Facolta di Medicina dell'Universita, Napoli, Italy). *Rend. Gastroenterol.* 6(3):217-218; 1974.

0617 DETECTION OF HEPATIC ARTERIO-VENOUS COMMUNICATIONS IN CIRRHOSIS OF THE LIVER [Abstract]. (Eng.) Groszmann, R. J.; Kravetz, D.; Parizeau, O. (Liver Sect., Pol. A. Posadas, Haedo, Argentina). *Clin. Res.* 23(3):250A; 1975.

0618 CIRRHOSIS ASSOCIATED WITH A PARTIAL α_1-ANTITRYPSIN DEFICIENCY. (Fre.) Morin, T.; Feldmann, G.; Martin, J. P.; Degott, C. Rueff, B.; Benhamou, J. P. (Hopital Beaujon, Clichy, France). *Bordeaux Med.* 8(7):784; 1975.

0619 THE ETIOLOGY OF GASTROINTESTINAL BLEEDING IN CIRRHOTICS: VALUE OF EMERGENCY ENDOSCOPY. (Fre.) Paris, J. C.; Voiment, Y. M.; Plouvier, B.; Tonnel, J.; Claerbout, J. F.; Marechal, A. (C.H.U., Lille, France). *Lille Med.* 20(4):342-345; 1975.

0620 EFFECT OF THE LIVER ON THE PLASMA HISTAMINE CONCENTRATION: MEASUREMENTS ON PRE- AND POSTHEPATIC BLOOD BEFORE AND AFTER GASTROINTESTINAL SURGERY. (Ger.) Beger, H. G.; Stopik, D.; Bittner, R.; Kraas, E.; Roscher, R. (Klinikum Westend, Freien Universitat, Berlin, Germany). *Z. Gastroenterol.* 13(4):474-478; 1975.

0621 EFFECT OF SPLENECTOMY ON THORACIC DUCT FLOW, ITS RELATION TO ASCITES IN CASES OF BILHARZIAL HEPATIC CIRRHOSIS. (Eng.) El-Gendi, M. A.; Sadek, A. M.; Zaky, H. A. (Sch. Medicine, Univ. Alexandria, Alexandria, Egypt). *Pahlavi Med. J.* 5(4):607-619; 1974.

0622 CHANGES IN IMMUNITY AND INFECTIONS IN ALCOHOLIC CIRRHOSIS. (Fre.) Paraf, A.; Renault, G.; Rautureau, J.; Fabia, F.; Damour-Lebard, J. (Hopital Franco-Musulman, 125, rue Stalingrad, 93009 Bobigny, France). *Sem. Hop. Paris* 51(12):811-815; 1975.

0623 MECHANISM INVOLVED IN ERYTHROPOIETIC CHANGES IN CIRRHOSIS. (Rus.) Zolotnitskaia, R. P. (I. M. Sechenov 1st Moscow Medical Inst., Moscow, USSR). *Lab. Delo* (7):395-397; 1975.

0624 DIFFICULTIES IN THE ANGIOGRAPHIC DIAGNOSIS OF PORTAL VEIN OBSTRUCTION. (Fre.) Faguer, P.; Brette, R.; Saubier, E. (Pavillon H, Hopital Edouard-Herriot, place d'Arsonval, F 69374, Lyon Cedex 2, France). *Arch. Fr. Mal. App. Dig.* 64(1):31-46; 1975.

0625 SIREPAR IN THE TREATMENT OF HEPATIC CIRRHOSIS AND ITS EFFECT ON AUTOANTIBODY LEVELS. (Eng.) Fassati, P.; Fassati, M.; Horejsi, J.; Jezkova, Z. (District Inst. Public Health, Prague, Czechoslovakia). *Tijdschr. Gastroenterol.* 17(4):259-266; 1974.

0626 LEUCOCYTE CHANGES IN CIRRHOSIS [Abstract]. (Eng.) Levin, G. E.; Baron, D. N. (Royal Free Hosp., London, England). *J. Clin. Pathol.* 28 (9):759; 1975.

See also, 0453, 0485, 0486, 0488, 0495, 0506, 0580, 0581, 0590, 0594, 0597, 0598, 0606, 0707.

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LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

0627 CHOLESCINTIGRAPHY WITH ^{99m}Tc-PENICILLAMINE. (Eng.) Krishnamurthy, G. T.; Tubis, M.; Blahd, W. H.; Endow, J. S. (VA Wadsworth Hosp. Center, Los Angeles, CA 90073). *Radiology* 115(1): 201-204; 1975.

After demonstrating the kinetics of ^{99m}Tc-penicillamine (Tc-Pen) in 7 normal female dogs and establishing the safety of the anticipated human dose in 3 other species of animals, 16 patients with suspected gallbladder disease were studied. The results were correlated with oral cholecystography and levels of serum bilirubin, alkaline phosphatase, SGOT, and SGPT. Satisfactory images of the gallbladder were obtained using a scintillation camera fitted with a pinhole collimator. The results of cholescintigraphy and contrast cholecystography compared favorably. The authors suggest that Tc-Pen is taken up by the hepatocytes and excreted into the bile canaliculi that enter the gallbladder. Tc-Pen may prove to be an ideal agent for evaluation of hepatocellular function.

0628 THE VALUE OF THE FATTY MEAL IN ORAL CHOLECYSTOGRAPHY.

(Eng.) Harvey, I. C.; Thwe, M.; Low-Beer, T. S. (Royal County Isle of Wight Hosp., Ryde, U.K.). *Clin. Radiol.* 27(1):117-121; 1976.

The authors reviewed 232 oral cholecystograms to determine the value of the fatty meal in oral cholecystography. Gallbladder opacification, duct visualization, separation of gallbladder from overlying bowel gas shadows, and the demonstration of abnormalities were assessed from prefatty meal films and then again in conjunction with those taken after fat, when contraction was also assessed. Of the 200 patients given the fatty meal, 132 were judged normal, 63 had gallstones, 4 had adenomyomatosis (1 with stones), and 2 had cholesterolosis. The postfatty meal films were found to be essential for the diagnosis of adenomyomatosis and cholesterolosis and considered to be occasionally helpful in diagnosing small stones. They were of little value in assessing the biliary ducts or separating the gallbladder from overlying bowel gas, and they were of no value in the diagnosis of functional biliary tract disorders.

0629 CLINICAL RELEVANCE OF ENDOSCOPIC RETROGRADE CHOLANGIO-PANCREATOGRAPHY (ERCP).

(Eng.) Seifert, E.; Fromm, H.; Huchzermeyer, H.; Lesch, P.; Misaki, F.; Rasmussen, C. W.; St. Stender, H. (Med. Sch. Hannover, W. Germany). *Endoscopy* 7(3): 133-138; 1975.

The clinical value of endoscopic retrograde cholangio-pancreatography (ERCP) was evaluated in 640 examinations. The frequency of questions yielded by the patients' history, biochemical examination, and standard x-ray findings were answered in 84.4%. Concerning the clinical question of both duct systems a positive answer was possible in 57.8%, of the pancreatic duct in 94.2%, and of the biliary system in 84.7%. The accuracy of visualization of the duct system increased with the experience of the examiner. In many cases the visualization of one of the two ducts was sufficient for a precise diagnosis. In 51.4% of the cases pathological lesions were found. It is concluded that ERCP is a very suitable method to establish an exact diagnosis, and that the accuracy rate to answer clinical questions is higher than expected.

0630 THE DIAGNOSIS OF CHOLESTASIS: LIPOPROTEIN X (LP-X).

(Ger.) Fischer, M.; Falkensammer, Ch.; Barouch, G.; Wuketich, St.; Kronberger, O.; Schnack, H. (Krankenhaus der Stadt Wien-Lainz, Wolkersbergenstrasse 1, A-1130 Wien, Austria). *Wien. Klin. Wochenschr.* 87(16):524-531, 1975.

The diagnostic specificity of a new method to detect obstructive jaundice by determination of lipoprotein X (LP-X) was tested in 144 patients with different types of hepatic diseases and compared with the usual chemical obstructive jaundice specific tests, such as bilirubin, SGOT, SGPT, alkaline phosphatase, leucine aminopeptidase, and γ-glutamyltranspeptidase. The LP-X test was performed using the test kit "LP-X Rapidophor" low-voltage electrophoresis of Immuno AG/Wien. The results were correlated with the histological classification of the liver biopsy specimen. In 82% of the histologically verified cases of obstructive jaundice, the result of the LP-X test was positive, while in 98.5% of the histologically negative cases, the result of the LP-X test was negative. The authors conclude that the LP-X method proved superior to chemical methods in providing a clear-cut positive or negative answer to the presence of cholestasis. In addition, the LP-X test was suitable for long-term follow-up investigation of patients with obstructive jaundice.

0631 FORMATION OF LIPOPROTEIN-X: ITS RELATIONSHIP TO BILE COMPOUNDS.

(Eng.) Manzato, E.; Fellin, R.; Baggio, G.; Walch, S.; Neubeck, W.; Seidel, D. (Div. Gerontology, Metabolic Disease, Policlinico, I-35100 Padua, Italy). *J. Clin. Invest.* 57(5):1248-1260; 1976.

The source of lipoprotein X (LP-X), its metabolism, and its fluctuations during cholestatic liver disease were studied. The lipid composition of bile LP was almost identical to LP-X; however, it differed from LP-X in its protein/lipid ratio and immunological and electrophoretic characteristics. Bile lipoprotein was converted into "LP-X-like" material *in vitro* by adding albumin or serum to native bile. The LP-X-like material formed *in vitro* was found to have physicochemical and chemical characteristics similar or identical to LP-X isolated from serum. As bile lipoprotein was converted into LP-X-like material by the addition of albumin to bile, LP-X was converted into bile-LP-like particles by adding bile salts to a LP-X-positive serum. Furthermore, experimental connection of the common bile duct to the vena cava was followed after a few hours by the appearance of LP-X-like material in the plasma. The results strongly suggest that bile LP is a precursor lipoprotein for LP-X and that it refluxes into the plasma pool under cholestatic conditions.

0632 EFFECTS OF OBESITY AND CALORIC INTAKE ON BILIARY LIPID METABOLISM IN MAN.

(Eng.) Bennion, L. J.; Grundy, S. M. (Natl. Inst. Arthritis, Metabolism, Digestive Diseases, Phoenix, AZ 85016). *J. Clin. Invest.* 56(4):996-1011; 1975.

The effects of obesity and caloric intake on biliary lipid metabolism were investigated in a series of related studies. The degree of saturation of gallbladder bile with cholesterol was significantly higher in a group of 23 obese healthy subjects than in 23 nonobese controls matched for age, sex, and race. Bile was also significantly more saturated in 11 obese subjects before than after weight reduction. The hepatic outputs of cholesterol, bile acids, and phospholipids were measured during constant duodenal infusion of formula in the same 11 subjects before and after weight reduction. Weight reduction resulted in significant reduction of cholesterol output but not of bile acid or phospholipid output. Very obese subjects had cholesterol secretion rates markedly higher than less obese subjects previously studied. In obese subjects, bile was supersaturated with cholesterol despite increased bile acid pool sizes and increased secretion rates of bile acids and phospholipids. Supersaturated bile in the obese could therefore be attributed to a single defect in lipid secretion, i.e., an excessive output of cholesterol. Nine obese men were studied on a weight maintenance diet and then during weight reduction on a 1,000-cal diet. Compared to weight maintenance, chronic caloric restriction resulted in reduced outputs of cholesterol, bile acids, and phospholipids, reduced bile acid pool size, and reduced synthesis and fecal excretion of cholesterol. Saturation of bile with cholesterol did not decrease during weight reduction, evidently because of the mobilization of cholesterol from adipose stores and the marked reduction in bile acid and phospholipid output during chronic caloric restriction. Acute alterations in caloric infusion rates did not fully reproduce the effects of chronic administration of high and low calorie diets. Likewise, chronic intake of hypercaloric diets by nonobese subjects did not reproduce the cholesterol hypersecretion characteristic of the obese. Thus, increased cholesterol secretion in obese subjects could not be fully explained by the amount of calories they ingested to maintain stable weight. It is concluded that obesity is characterized by excessive hepatic secretion of cholesterol, which results in supersaturated bile.

0633 COUNTERFEIT CHOLECYSTITIS: A COMMON DIAGNOSTIC PROBLEM. (Eng.) Halasz, N. A. (Univ. California, San Diego Sch. Medicine, 225 West Dickinson St., San Diego, CA 92103). *Am. J. Surg.* 130(2):189-193; 1975.

A retrospective study was made of 238 patients admitted in a 5-yr period with a diagnosis of acute cholecystitis. The diagnosis was confirmed in 191 patients. Of these, 52 underwent operation within 48 hr after admission, 104 had later operations, and 35 had no surgery, but biliary disease was confirmed by radiography or other means. Of the total 238 patients, 47 were ultimately diagnosed with disease other than acute cholecystitis. Among these, five patients underwent exploration with the misdiagnosis of acute cholecystitis. In 18 patients with renal disease, pain initiated in the right kidney or upper ureter. Intrahepatic swelling was present in 6 cases, pancreatitis in 10, pneumonia or pleurisy in 2, appendicitis in 5, and 6 patients had hepatitis. Pre-operative study and interval cholecystectomy are recommended whenever possible to avoid misdiagnosis and unnecessary surgery.

0634 CONTROLLED CLINICAL TRIAL COMPARING EARLY WITH INTERVAL CHOLECYSTECTOMY FOR ACUTE CHOLECYSTITIS. (Eng.) McArthur, P.; Cuschieri, A.; Sells, R. A.; Shields, R. (Dept. Surgery, Univ. Liverpool, Liverpool, England). *Br. J. Surg.* 62(10): 850-852; 1975.

A prospective study is presented of 32 patients with acute cholecystitis in which traditional management (initial conservative treatment with antibiotics followed by elective cholecystectomy) is compared with early cholecystectomy. Of the 17 patients managed conservatively, there was a misdiagnosis in 2. In the remaining 15 patients with acute cholecystitis, 3 required urgent operation because of failure of medical treatment. Of the 15 patients treated by early cholecystectomy, there was a misdiagnosis in 1. Surgery was technically difficult in two patients but cholecystectomy was possible in all. There was no mortality in either group or any complication directly attributable to the biliary surgery. The incidence of minor postoperative complications was only slightly greater in those treated by early operation. The length of postoperative stay was similar in both groups but those treated conservatively spent an average of 11 more days in the hospital. The preliminary results indicate that patients with acute cholecystitis treated by early cholecystectomy spend less time in the hospital and avoid the complications of failed conservative treatment without the added risk of increased postoperative mortality and major complications.

0635 A CONTROLLED TRIAL OF DRAINAGE AFTER CHOLECYSTECTOMY. (Eng.) Gordon, A. B.; Bates, T.; Fiddian, R. V. (Univ. Colorado Medical Center, Denver, CO). *Br. J. Surg.* 63(4):278-282; 1976.

A prospective controlled trial of drainage after cholecystectomy was made in a consecutive series of 143 patients undergoing cholecystectomy. Fifty patients were randomly allocated to a drainage group and a further 50 to a nondrainage group. The remaining 43 patients were drained electively because the common bile duct was explored or because of infection or incomplete hemostasis. There was no significant difference in the incidence of wound infection or other complications between the drainage and nondrainage groups. The duration of postoperative pyrexia, the number of analgesic injections, and the length of postoperative hospital stay were the same in both. One patient in the drainage group had a reactionary hemorrhage from the drain site requiring transfusion. There was no mortality but one patient in the elective drainage group had to be re-explored for a subhepatic abscess. Three patients in this group drained bile from the drain for 3-9 days, but all had a T tube in place. These experiments fail to demonstrate any advantage or disadvantage in draining the gallbladder bed after cholecystectomy.

0636 GALLBLADDER DISEASE: PREVALENCE IN A SOUTH WALES INDUSTRIAL TOWN. (Eng.) Bainton, D.; Davies, G. T.; Evans, K. T.; Gravelle, I. H. (Medical Res. Council Epidemiology Unit [South Wales], 4 Richmond Rd., Cardiff CF2 3AS, U.K.). *N. Engl. J. Med.* 294(21):1147-1149; 1976.

The prevalence of gallstones was determined in a weighted random sample of the specially enumerated population of a South Wales industrial town. In a population of 1442 inhabitants (1043 men, 68.3% response rate; 399 women, 61.2% response rate) examined by cholecystography, the overall prevalence rates were 6.2% for men 45-69 yr of age and 12.1% for women of the same ages. There was no marked increase in prevalence with age in either sex. Symptoms of dyspepsia said to be suggestive of gallstones were found with approximately equal frequency in those with and without gallbladder disease.

0637 LIVER ABNORMALITIES AND GALLSTONES: A PROSPECTIVE COMBINED CLINICAL, HISTOLOGICAL AND SURGICAL STUDY. (Eng.) Triger, D. R.; MacIver, A. G.; Gamlen, T. R.; Wilken, B. J. (Southampton Univ. Hosp., Southampton, England). *Br. J. Surg.* 63(4):272-277; 1976.

A prospective study of 57 patients (41 women and 16 men) coming to elective cholecystectomy for gallstone disease is presented and the clinical, biochemical, and immunological features were correlated with the histological changes in core biopsies of the liver obtained at surgery. Only 13 biopsies were normal. Ten showed changes of acute duct obstruction, 16 showed minimal portal tract abnormalities, and 10 showed moderate portal tract inflammation and scarring. Changes were more marked in male patients. Clinical and biochemical investigations were not useful in predicting histological appearance, apart from cases with jaundice at the time of operation where changes of acute duct obstruction were usually seen. Autoantibodies were present in 50% of cases tested, and all persisted for at least 6 months after surgery. They were more common in patients with marked histological changes. Operative cholangiography was of little use in predicting histological change. These findings suggest that the possibility of gallstones should be considered in the interpretation of any abnormal liver biopsy, irrespective of clinical symptoms or biochemical investigations.

0638 EFFECT OF PRIMARY BILE ACID INGESTION ON BILE ACID METABOLISM AND BILIARY LIPID SECRETION IN GALLSTONE PATIENTS. (Eng.) LaRusso, N. F.; Hoffman, N. E.; Hofmann, A. F.; Northfield, T. C.; Thistle, J. L. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *Gastroenterology* 69(6):1301-1314; 1975.

The effects of chenodeoxycholic (chenic) or cholic acid administration on bile acid kinetics, biliary bile acid composition, daily biliary lipid secretion, and fasting-state bile lipid composition were compared in six patients with gallstones. Bile acid kinetics were measured by isotope dilution, and hourly outputs of bile acid, cholesterol, and phospholipid were quantified by duodenal perfusion over 24 hr during a pretreatment period and two randomized treatment periods with chenic acid (7.1-24.5 mg/kg) or cholic acid (8.9-25.8 mg/kg). During chenic acid ingestion, bile contained predominantly chenyl conjugates. During cholic acid ingestion, bile was composed of about equal amounts of cholyl and deoxycholyl conjugates; chenyl conjugates decreased markedly due in part to a 50% decrease in chenic acid synthesis. Total bile acid pool size doubled in half the patients receiving either bile acid. Biliary bile acid composition reflected pool size changes, i.e., during cholic acid treatment, biliary bile acids consisted mainly of cholic acid and its bacterial degradation product, deoxycholic acid. Compared to cholic acid, chenic acid caused decreased cholesterol output with no difference in bile acid or phospholipid output. Therefore, bile unsaturated with cholesterol entered the duodenum for more hr/day during chenic acid ingestion than during the cholic or pretreatment periods. There was no relation among bile acid pool size, bile acid output, and hr/day of supersaturated bile; there was an inverse relation between total pool size and recycling frequency such that bile acid output remained stable over a wide range of pool sizes. Fasting-state gallbladder bile was supersaturated during the cholic and pretreatment periods, but became unsaturated during chenic acid ingestion. However, hr/day of supersaturated bile could not be reliably predicted from the degree of saturation of fasting-state gallbladder bile ($r = 0.62$). The efficacy of chenic acid and the lack of efficacy of cholic acid for gallstone dissolution appear related to their different specific effects on biliary cholesterol secretion and not to any effect on bile acid and phospholipid secretion or bile acid pool size.

0639 INCREASED SULFATION OF LITHOCHOLATE IN PATIENTS WITH CHOLESTEROL GALLSTONES DURING CHENODEOXYCHOLATE TREATMENT. (Eng.) Stiehl, A.; Raedsch, R.; Kommerell, B. (Gastroenterology Unit, Univ. Heidelberg, Heidelberg, Germany). *Digestion* 12(2):105-110; 1975.

The sulfated and nonsulfated lithocholate in bile was determined before and after chenodeoxycholate administration (1.0-1.5 g/day) to 13 patients (aged 55-73 yr) with cholestrol gallstones. Trace amounts of ^{14}C-taurolithocholate and ^{11}C-taurolithocholate sulfate internal standards were added to concentrated bile. In control experiments, four patients were administered i.v. 15 μCi ^{14}C-lithocholate 24 hr before the bile was obtained. Sulfated and nonsulfated ^{14}C-lithocholate conjugates in bile were separated on Sephadex column chromatography. During the treatment period the bile composition changed markedly. Chenodeoxycholate increased from 42.9% of the total bile salts before treatment to 79.3% after 8 weeks of treatment. Ursodeoxycholate increased from 2.3 to 12.6% and lithocholate from 1.1 to 3.3%. In contrast, cholate decreased from 40.3% of the total bile salts to 3.1% and deoxycholate decreased from 12.5 to 2.5%. Less than 5% of chenodeoxycholate, ursodeoxycholate, cholate, and deoxycholate in bile were sulfated esters. In contrast, considerable amounts of lithocholate were sulfated. The sulfation of lithocholate increased from 32.8% of the total lithocholate before treatment to 73.9% after 8 weeks of treatment. Sulfated lithocholate was more rapidly eliminated in feces and urine and was less toxic than the nonsulfated compound. Therefore, the authors conclude that the increase in the sulfation of lithocholate observed in patients with cholesterol gallstones during chenodeoxycholate treatment represents a protective mechanism.

0640 BILE ACIDS IN BILE DURING LONG-TERM CHENODEOXYCHOLIC ACID TREATMENT. (Eng.) Bremmelgaard, A.; Pedersen, L. (Rigshospitalet, Blegdamsvej 9, 2100 Copenhagen O, Denmark). *Scand. J. Gastroenterol.* 11(2):161-165; 1976.

The effect of treatment with 0.50-0.75 g chenodeoxycholic acid/day over 3-4 months on biliary bile acids was studied in four women and one man with radiolucent gallstones. The relative concentrations of conjugated and sulfated bile acids in duodenal bile were measured in the five patients before and during treatment. Lithocholic acid constituted 1.8% of total conjugated and sulfated bile acids before, and 2.6% during treatment. Lithocholic acid was the predominant bile acid in the sulfate fraction in three patients and chenodeoxycholic acid in two. Sulfated bile acids constituted less than 1% of total bile acids and did not increase during treatment. Ursodeoxycholic acid, the other major metabolite of chenodeoxycholic acid, occurred in higher amounts during therapy. The unsaturated bile acid 3β-hydroxy-Δ^5-cholenic acid, which was found exclusively as its sulfate ester, showed a slight fall. The average glycine/taurine conjugation ratio rose from 2.2 to 4.5. The results confirm that profound alterations in the biliary bile acids take place when chenodeoxycholic acid is administered to patients with cholesterol gallstones.

0641 CURRENT STATUS OF HEPARIN DISSOLUTION OF GALLSTONES: EXPERIMENTAL AND CLINICAL OBSERVATIONS. (Eng.) Gardner, B.; Dennis, C. R.; Patti, J. (Downstate Medical Center, 450 Clarkson Ave., Brooklyn, NY 11203). *Am. J. Surg.* 130(3): 293-295; 1975.

Experimental evidence for the use of heparin in bile for the dissolution of gallstones is reviewed. *In vitro* experiments have demonstrated the efficacy of heparin alone and in combination with bile salts for stone dissolution. Clinical experience using a heparinized saline flush in 43 patients with retained gallstones demonstrated disappearance of the stones in 31 of the patients. Seven of the 12 in whom treatment failed were treated for less than a week and underwent reoperation at that time. Failure of the heparin treatment may be related to an inadequate course, a too solidly compacted stone, or heavy calcification. The authors recommend the use of heparin, 25,000 U in 250 ml saline every 8 hr, as a constant, continuous drip for treatment of retained common duct stones as an alternative to early reoperation.

0642 GALLSTONES AND PERNICIOUS ANEMIA. (Dan.) Halver, B. (County Hosp., DK-4930 Maribo, Denmark). *Ugeskr. Laeg.* 137(5):259-261; 1975.

A retrospective study of the frequency of gallstones in 199 patients with pernicious anemia was conducted. Gallstones were found in 15 patients before diagnosis of pernicious anemia and were detected in 63 more patients after the onset of pernicious anemia. The gallstones were symptomatically manifest in 43 of the 63 patients. Autopsies on 18 patients revealed gallstones in 11 cases; the gallbladder had been removed in two patients. The incidence of gallstones was the same in men and women and was highest at around 70 yr of age as opposed to a peak around 50 yr of age in patients without pernicious anemia. Hemolysis and vitamin B_{12} deficiency in pernicious anemia are assumed to be the essential etiological factors in the formation of pigment stones.

0643 POSSIBLE ROLE OF E. coli BETA-GLUCORONIDASE IN BILE STONE FORMATION. (Hun.) Jakab, F.; Vutskits, Zs. (Clinic Surgery II, Semmelweiss Medical Univ., Budapest, Hungary). *Magy. Sebesz.* 27(6):377-381; 1974.

Escherichia coli-free bile samples from 19 choledochotomized patients with gallstones (other than the calcium bilirubinate type) were incubated with *E. coli* to study the role of *E. coli* beta-glucoronidase in gallstone formation. Sediments of 16 of the incubated samples contained calcium bilirubinate. A simultaneous reduction in the calcium and bilirubin contents in the bile was observed, suggesting the incorporation of these substances into calcium bilirubinate. Beta-glucoronidase activity was detected only in samples containing *E. coli*. These findings suggest a possible role of *E. coli* beta-glucoronidase in gallstone formation.

0644 SERUM 5'-NUCLEOTIDASE IN NEONATAL HEPATITIS AND BILIARY ATRESIA. (Eng.) Chen, S.-H.; Lee, T.-C. (Coll. Medicine, Natl. Taiwan Univ., Taipei, Republic of China). *Acta Paediatr. Sin.* 15(4):139-145; 1974.

The diagnostic value of serum 5'-nucleotidase determinations in 20 Chinese infants (aged 5-17 weeks) with neonatal hepatitis (12) and biliary atresia (8), and 13 normal controls (aged 12-26 weeks) for differentiating between biliary atresia and neonatal hepatitis was evaluated. AMP buffered substrate was used to determine 5'-nucleotidase activity in serum (0.2 ml) by measuring the inorganic phosphorous formed. A correction factor for the formation of inorganic phosphorous was determined by incubating serum (0.2 ml) with glycerophosphate buffered substrate. Serum 5'nucleotidase levels (Bodansky U/l) differed significantly in the three groups, i.e., 9.3, 19.9, and 5.3, resp. This study is in agreement with the observation that in infants with congenital extrahepatic biliary obstruction, where bile duct proliferation is a feature, the enzyme levels are markedly raised and are significantly different from those with neonatal hepatitis. This finding is of diagnostic value in differentiating between the two conditions.

0645 ONGOING CIRRHOSIS AFTER SUCCESSFUL PORTICOENTEROSTOMY IN INFANTS WITH BILIARY ATRESIA. (Eng.) Altman, R. P.; Chandra, R.; Lilly, J. R. (Children's Hosp. Natl. Medical Center, 2125

13th St., N.W., Washington, DC 20009). *J. Pediatr. Surg.* 10(5):685-691; 1975.

Eleven of 31 patients treated by porticoenterostomy procedures for extrahepatic biliary atresia were restudied 3-23 months postoperatively by liver biopsy. Three patients were restudied a third time. At the time of biopsy, repeat isotope scan and biochemical determinations of liver function were obtained. The clinical condition of most of these infants was satisfactory. Six of the rebiopsied patients had bilirubins in the normal range, while four had elevations between 1.5 and 3.5 mg/100 ml. In one, the bilirubin was 7 mg/100 ml. In all patients, the rose bengal scan confirmed excretion of isotope by the liver; six were normal and five showed slight-to-moderate retention of isotope at 24-36 hr. Despite absence of clinical jaundice, normal rose bengal scan, and normal liver function studies, eight showed progressive degrees of hepatic fibrosis when compared to the results of the biopsy taken at the time of porticoenterostomy. Two patients showed stable histology and one, after progressing on a second biopsy, had normal liver histology on a third study. Seven patients experienced at least one episode of cholangitis (manifested by a temperature rise and serum bilirubin elevation). In 10 patients, there was complete absence of cholestasis in the specimen. The authors conclude that there are no valid criteria in these 11 patients to predict the progression, stabilization, or improvement; neither age nor histologic pattern at porticoenterostomy affected the outcome. Thus, the authors suggest that until prognostic criteria are available, all infants under 3 months of age should be treated by porticoenterostomy.

0646 BONE CHANGES IN CONGENITAL BILIARY ATRESIA. RADIOLOGIC OBSERVATION OF 8 CASES. (Eng.) Katayama, H.; Suruga, K.; Kurashige, T.; Kimoto, T. (Juntendo Univ. Sch. Medicine, 2-1-1 Hongo, Bunkyo-ku, Tokyo, Japan 113). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 124(1):107-112; 1975.

Roentgenograms of 38 cases of biliary atresia revealed 8 cases (2 boys and 6 girls) of osseous abnormalities. Definte generalized demineralization of bones was found in three cases, metaphyseal abnormalities in five cases, and fractures in four cases. Marked demineralization of bones was seen in cases in which the clinical course was more than 1 yr. There was no good correlation between osseous changes and severity of liver dysfunction.

0647 BILE FLOW AND BILIARY LIPID SECRETION FOLLOWING RELEASE OF BILIARY OBSTRUCTION IN MAN. (Eng.) Lindblad, L.; Hammarsten, J.; Scherstein, T. (Dept. Surgery, Univ. Goteborg, Goteborg, Sweden). *Scand. J. Gastroenterol.* 10(6):633-639; 1975.

To elucidate the relationship between bile acid secretion and the secretion of lecithin and cholesterol in the postcholestatic condition, five patients were studied after release of complete biliary obstruction. Ten patients operated on for uncomplicated gallstone disease served as controls. The secretion of bile acids, which constituted only newly synthesized acids, increased in the postcholestatic period 2.5-22 times. In spite of that, the secretion rate of bile acids was low ($\leq$ 7.5 μmol/min). The pattern of the relationships between bile acid secretion and bile flow and bile acid secretion and lecithin/cholesterol secretion was the same in the postcholestatic patients as in the controls. However, the bile flow showed a higher bile acid dependency in the postcholestatic condition, and the bile acid-independent flow varied considerably in these patients compared with controls. Linear relations between the bile acid and lecithin/cholesterol secretion rates were found. Extrapolation to zero bile acid secretion revealed Y-intercepts, which were not statistically significantly different from zero. Calculations of bile acid/lecithin and bile acid/cholesterol relations in the controls at correspondingly low bile acid secretion rates ($\leq$ 5 μmol/min) gave results similar to those in the study group. The bile was supersaturated with cholesterol in all the postcholestatic patients similar to the condition in the controls at correspondingly low bile acid secretion rates. It is concluded that the bile acids are determinative for the biliary secretion of cholesterol/lecithin even at very low bile acid secretion rates. This conclusion was valid in patients with presumably normal liver function as well as in the early phase after release of severe cholestasis.

0648 MEMBRANEOUS OBSTRUCTION OF THE COMMON BILE DUCT. (Eng.) Pinter, A.; Pilaszanovich, I.; Schafer, J.; Weisenbach, J. (No affiliation given). *J. Pediatr. Surg.* 10(5):839-840; 1975.

A case of membranous atresia of the common bile duct in a 32-day-old male child with a 22-day history of jaundice is presented. On admission, the liver was found to extend 1 cm below the costal margin. Stools were white, the urine was dark, and the bile was strongly positive. Total serum bilirubin was 11.8 mg/100 ml, direct 8.7 mg/10 ml. At laparotomy, the liver was mildly enlarged and of slightly greenish color, and the gallbladder was almost empty. A cholangiogram revealed that the intrahepatic bile ducts, the tortuous ducts, the fine cystic duct, and the common bile duct ended blindly behind the duodenum. There was no passage into the duodenum. A membrane located at the level of the ampulla of Vater prevented a rubber probe from entering the small intestine. The membrane was incised and stretched, and a thin catheter was introduced into the opening of the common bile duct and passed through the membrane into the duodenum. The other end of the catheter was brought out through the abdominal wall. During the first 3 postoperative days the bile was discharged via the catheter, and later it was passed with the normal enteral circulation. By the 10th day the jaundice had disappeared, the stools became green and later yellow in color, and total serum bilirubin was 1.5 mg/100 ml, direct 1.0 mg/ml. At the age of 18 months, the child had not had jaundice or attacks of cholangitis since surgery. The authors conclude that this is the first case of membranous atresia of the common bile duct reported in the literature.

0649 THE EFFECT OF EXTERNAL DRAINAGE OF BILE ON CHOLESTEROLEMIA. (Eng.) Hankiewicz, J.; Rudzka, E. (First Clinic Internal Diseases, Silesian Acad. Medicine, ul. Reymonta 8, PL-40-029 Katowice, Poland). *Atherosclerosis* 22(2):313-315; 1975.

The effect of bile secretion on serum cholesterol concentration was studied in 50 patients who had undergone biliary duct surgery. Total and esterified cholesterol concentrations in samples of serum and bile were determined at the time of bile drainage from the common bile duct. The daily amount of drained bile in these patients averaged 339 ml for 5 consecutive days after surgery. From day 5 to day 15, drainage averaged 342 ml/day. The total bile concentration of cholesterol up to day 15 and from day 5 to day 15 averaged about 240 mg/100 ml (range, 30-705 mg/100 ml), and the esterified fraction was about 157 mg/100 ml. The excretion of cholesterol in bile in both postoperative periods averaged 725 and 881 mg/day. The total serum cholesterol concentration on the day of surgery ranged from 153-500 mg/ml. During external bile drainage there was a significant decrease in cholesterolemia to about 30%. A direct relation was found on day 5 between the decrease of serum cholesterol and the amount of cholesterol excreted in bile. There was also a direct relation between the concentration of total and esterified cholesterol in serum and the concentration of these components in bile. These data suggest that the loss of cholesterol with the bile was probably compensated for by an increase of its synthesis.

0650 RENAL FAILURE IN OBSTRUCTIVE JAUNDICE--PATHOLOGIC FACTORS. (Eng.) Wardle, E. N. (Royal Victoria Infirmary, Newcastle-upon-Tyne, NE1 4LP, U.K.). *Postgrad. Med. J.* 51(598):512-514; 1975.

The factors involved in the pathogenesis of acute renal failure in obstructive jaundice are summarized. In a patient with obstructive jaundice, preliminary dehydration combined with the toxic effects of free bilirubin and serum bile acids, together with factors that cause inhibition of fibrinolysis, determine a high degree of renal susceptibility to ischemia. Evidence from animals and man suggests that intravascular coagulation determined by endotoxemia from the obstructed biliary system occurs at the onset of acute renal failure. Endotoxin is unique in being able to produce all those factors that separately cause a primary increase of renal arteriolar constriction. The author suggests that the evidence is consistent with the hypothesis that endotoxin is the cause of the majority of cases of acute renal failure in man.

0651 ANTIBIOTIC TREATMENT OF BILIARY SEPSIS. (Eng.) Keighley, M. R. B.; Drysdale, R. B.; Quroaishi, A. H.; Burdon, D. W.; Alexander-Williams, J. (Dept. Surgery, Queen Elizabeth Hosp., Birmingham, B12 2TH England). *Surg. Clin. N. Am.* 55(6):1379-1390; 1975.

Antibiotic therapy for the control of established biliary sepsis and the prevention of postoperative complications among patients with infected bile at operation is reviewed. Biliary sepsis is usually associated with some degree of obstruction in the biliary tract. *Escherichia coli* is the most commonly identified microorganism, occurring in 31% of 231 patients undergoing biliary operations. The incidence of wound sepsis in patients in whom the bile is sterile or infected is 13 or 35%, resp. Management of patients with biliary sepsis falls into two categories; first, the use of prophylactic chemotherapy for patients requiring biliary operations and second, the choice of an antibiotic in patients with acute cholecystitis or unresolving cholangitis. In either case the presence and type of organism must be determined before or at operation; blood cultures and a duodenal fluid sample are taken before antibiotic therapy. Prophylactic chemotherapy is justified only when the bile is infected at operation. If gram-positive organisms are identified, ampicillin is recommended while gentamicin is recommended for the treatment of gram-negative bacteria. If surgery is needed, antibiotics are continued, modified only if operative bile cultures indicate the presence of a resistant organism. However, if there is an obstruction, therapeutic levels often cannot be achieved in the bile. It is concluded that serum concentrations of a suitable antimicrobial are required to prevent and control the systemic manifestations of biliary sepsis.

0652 SPONTANEOUS INTERNAL BILIARY FISTULAS. (Eng.) Patrassi, N.; Basoli, A.; Loriga, P.; Blandamura, V.; Carboni, M. (Univ. Rome Medical Sch., Policlinico Umberto I, 00161 Rome, Italy). *Am. J. Gastroenterol.* 64(3):181-186; 1975.

The etiology, diagnostic investigations, and surgical procedures performed on 58 patients with spontaneous internal biliary fistulas are reported. Cholelithiasis and peptic ulcer were presumed to be the cause of fistula in 53 and 5 patients, resp. Preoperative diagnosis was established on 31 patients, while the remaining 27 fistula were found incidentally at surgery. Surgical treatment included a wide variety of operations performed on the basis of the pathologic features of fistula. Overall mortality rate was 5%, and morbidity was 13%. The unsatisfactory results of the surgical treatment of internal biliary fistulas indicate that early cholecystectomy should be performed in all patients with cholelithiasis.

0653 LONG TERM TRANSHEPATIC INTUBATION FOR HILAR HEPATIC DUCT STRICTURES. (Eng.) Cameron, J. L.; Skinner, D. B.; Zuidema, G. D. (Johns Hopkins Medical Inst., Baltimore, MD). *Ann. Surg.* 183(5):488-495; 1976.

A technique for repairing benign high hilar hepatic

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duct strictures using transhepatic intubation with a large bore silastic stent in 10 patients is described. In nine instances, the stricture involved the common hepatic duct and in one, the right and left hepatic ducts. Nine of the strictures followed cholecystectomy; one followed the primary repair of a gun shot wound to the hepatic duct. Hepaticojejunostomies were created and the transhepatic silastic stent was left in place for 6 months in one patient, and for 12 months in eight patients. In one patient the silastic stents remained in place. There were no treatment failures. All patients were healthy and at full activity from 1 yr, 3 months to 6 yr, and 6 months from the time of repair (average 3 yr, 5 months), resp. In the nine patients whose stents were removed, the serum bilirubin levels were normal. There were no episodes of cholangitis following repair. The authors recommend this method of repair using long-term transhepatic silastic stents for all high hilar hepatic duct strictures.

0654 IDIOPATHIC SCLEROSING CHOLANGITIS. PATHOPHYSIOLOGIC OBSERVATIONS. (Eng.) Douglass, H. O., Jr. (Roswell Park Memorial Inst., 666 Elm St., Buffalo, NY 14263). *Am. J. Surg.* 130(1): 82-87; 1975.

Selective hepatic arteriography and umbilical portography in a 50-yr-old man with idiopathic sclerosing cholangitis revealed uneven distribution of blood flow through the liver. The majority of the contrast media was in the central portion of the liver. Mild portal hypertension was present. The stenotic biliary tree offered no unusual resistance to the passage of dye from the main biliary radicals into the duodenum. T tube drainage dramatically relieved pruritis, but clinical improvement with weight gain, disappearance of jaundice, and reduction of portal pressure did not occur until after the administration of steroids. After 1 yr of steroid therapy, biopsy showed a reduction in the periportal inflammatory reaction and lessening of the diffuse stenosis of the biliary tree. It is suggested that sclerosing cholangitis accompanying biliary calculous disease and that accompanying ulcerative colitis may be a variant of a common pathogenic process.

0655 HEREDITY AND DISEASES OF THE EXTRA-HEPATIC BILE DUCTS. (Fre.) Paris, M. J. (No affiliation given). *Bordeaux Med.* 8(7):777-782; 1975.

0656 BIOLOGICAL CHARACTERISTICS OF Pseudomonas pyocyanea ISOLATED FROM BILE IN CHRONIC INFLAMMATORY DISEASES OF THE GALLBLADDER AND BILE DUCTS. (Rus.) Ordzhonikidze, Z. V.; Kurashvili, V. E.; Salakaia, R. G. (Tbilisi Inst. Postgraduate Medicine, Tbilisi, USSR). *Soobshch. Akad. Nauk Gruzinsk. SSR* 78(3):701-704; 1975.

0657 THE VALUE OF GASTRIC ACIDIFICATION IN BILIARY [ABDOMINAL ?] MIGRAINE. (Fre.) Chevrel, B. (Hopital St.-Antoine, 184, rue Fg Saint-Antoine, 75012 Paris, France). *Med. Chir. Dig.* 4(2):133-135; 1975.

0658 GALLBLADDER AND CYSTIC DUCT AGENESIA: DESCRIPTION OF TWO CASES. (Ita.) Zanelli, G.; Ferrero, S.; Patrone, P. (Santa Corona Hospitals, Pietra Ligure, Italy). *Minerva Chir.* 30(9): 539-541; 1975.

0659 SYMPOSIUM ON: GALL-BLADDER AND PANCREAS. GALL-STONES. (Eng.) Rains, A. J. H. (Charing Cross Hosp. Medical Sch., London, England). *Practitioner* 214(1284):749-752; 1975.

0660 DISSOLUTION OF HUMAN GALLSTONES: THE EFFICACY OF BILE SALT, BILE SALT PLUS LECITHIN AND HEPARIN SOLUTIONS. (Eng.) Toouli, J.; Jablonski, P.; Watts, J. M. (Dept. Surgery, Monash Univ., Melbourne 3004, Australia). *J. Surg. Res.* 19(1):47-53; 1975.

0661 BILIARY-TRACT OBSTRUCTION. (Eng.) Blumgart, L. H.; Imrie, C. W. (Royal Infirmary, Glasgow, Scotland). *Practitioner* 214(1284): 753-762; 1975.

0662 MULTIVARIATE ANALYSIS OF CLINICAL AND OPERATIVE FINDINGS ASSOCIATED WITH BILIARY SEPSIS [Abstract]. (Eng.) Keighley, M. R. B.; Crapp, A. R.; Flinn, R.; Alexander-Williams, J. (General Hosp., Birmingham, England). *Br. J. Surg.* 62(8):658-659; 1975.

0663 THE SURGICAL TREATMENT OF COMMON BILE DUCT LITHIASIS. (Eng.) Stefanini, P.; Carboni, M.; Perrotta, G.; Patrassi, N. (Second Surgical Clinic, University Rome, Rome, Italy). *Rend. Gastroenterol.* 7(1):43-47; 1975.

0664 MASSIVE BILE PERITONITIS IN INFANCY DUE TO SPONTANEOUS BILE DUCT PERFORATION WITH PORTAL VEIN OCCLUSION. (Eng.) Moore, T. C. (UCLA-Harbor General Hosp., UCLA Sch. Medicine, Torrance, CA 90509). *J. Pediatr. Surg.* 10(4):537-538; 1975.

0665 MUCINOSIS OF THE BILE DUCTS. (Rus.) Sitenko, V. M.; Novikov, K. V. (S. M. Kirov Military Medical Academy, Leningrad, USSR). *Vestn. Khir.* (6):126-128; 1975.

0666 IS CHOLECYSTOSTOMY NECESSARY IN ACUTE CHOLECYSTITIS COMPLICATED BY JAUNDICE? (Rus.) Tetdoev, A. M.; Stoiko, Iu. M. (S. M. Kirov Military Medical Academy, Leningrad, USSR). *Klin. Khir.* (5): 56-59; 1975.

0667 CHOLECYSTECTOMY IN THE ELDERLY PATIENT. (Rus.) Glubokovskaia, V. M.; Shvartsman, Z. D.; Gridasov, V. F. (Leningrad Inst. Postgraduate Medicine, Leningrad, USSR). *Klin. Khir.* (5):62-65; 1975.

0668 LONG- AND SHORT-TERM RESULTS FROM SURGICAL TREATMENT OF ACUTE CHOLECYSTITIS. (Rus.) Makokha, N. S.; Grednev, V. M. (M. I. Kalinin Medical Inst., Omsk, USSR). *Klin. Khir.* (5):65-68; 1975.

0669 STUDY OF BILE PRESSURE IN PATIENTS WITH BILE DUCT DRAINAGE. (Rus.) Belskii, A. V.; Klokova, R. D. (Saratov Medical Inst., USSR). *Klin. Khir.* (5):68-70; 1975.

0670 DIVERTICULA OF THE AMPULLA OF VATER. (Spa.) Pujol-Soler, R.; Fernandez-Cruz, L.; Garcia-Olives, F. (Clinica Tres Torres, Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 45(5):599-566; 1975.

0671 REPARATIVE SURGERY ON THE BILIARY TRACT. (Ger.) Mattig, H.; Rothe, G. (Bezirkskrankenhaus St. Georg, Leipzig, Germany). *Zentralbl. Chir.* 100(6):332-338; 1975.

0672 COMPLICATIONS RESULTING FROM T-DRAINS AFTER REVISION OF THE COMMON BILE DUCT. (Ger.) Klug, W. (Krankenhaus St.-Joseph-Stift, Dresden, Germany). *Zentralbl. Chir.* 100(6):339-342; 1975.

0673 ACUTE EMPHASEMATOUS [SIC] CHOLECYSTITIS: A CASE REPORT AND REVIEW OF THE LITERATURE. (Eng.) Howell, H. D.; Ali, S. D.; Dike, N. A.; Calhoun, T.; Kurtz, L. H. (District of Columbia General Hosp., Washington, DC). *J. Natl. Med. Assoc.* 67(4):287-288; 1975.

0674 EMPYEMA OF GALLBLADDER IN AN INFANT. (Eng.) Jamieson, P. N.; Shaw, D. G. (Univ. Coll. Hosp., Gower St., London WC1E 6AU, England). *Arch. Dis. Child.* 50(6):482-484; 1975.

0675 POSTOPERATIVE RETAINED CHOLEDOCHOLITHIASIS: PERCUTANEOUS ENDOSCOPIC EXTRACTION [Abstract]. (Eng.) Sherman, H. I.; Margeson, R. C.; Davis, R. C., Jr. (Crawford W. Long Memorial Hosp., Emory Univ., Atlanta, GA). *Gastrointest. Endosc.* 21(4):196; 1975.

0676 IMPROVED CHOLEDOCHOFIBERSCOPES AND NON-SURGICAL REMOVAL OF RETAINED BILIARY CALCULI UNDER DIRECT VISUAL CONTROL [Abstract]. (Eng.) Yamakawa, T.; Mieno, K.; Shikata, J. (Teikyo Univ. Sch. Medicine, Tokyo, Japan). *Gastrointest. Endosc.* 21(4):198; 1975.

0677 ENDOSCOPIC REMOVAL OF BILIARY STONES AND SLUDGE: PRELIMINATY EXPERIENCE [Abstract]. (Eng.) Zimmon, D. S.; Falkenstein, D. B.; Kessler, R. E. (Manhattan Veterans Admin. Hosp., New York, NY). *Gastrointest. Endosc.* 21(4):199; 1975.

0678 DIRECT MANOMETRIC STUDY OF THE SPHINCTER OF ODDI IN MAN. A NEW METHOD [Abstract]. (Eng.) Meckeler, K. J. H.; Borow, M. (Somerset Hosp., Somerville, NJ). *Gastrointest. Endosc.* 21(4):192; 1975.

0679 PATHOPHYSIOLOGICAL RELATIONSHIP BETWEEN CHOLELITHIASIS AND DIABETES MELLITUS: THE ROLE OF CHOLECYSTECTOMY. (Eng.) Simi, M.; Leardi, S.; Miceli, F.; Cavaliere, F. (Inst. Pathology Surgery, Univ. Rome, Rome, Italy). *Surg. It.* 4(3):174-179; 1974.

0680 ACALCULOUS CHOLECYSTITIS AND MALIGNANT ILEAL CARCINOID TUMOR. (Eng.) Odelowo, E. O. O.; Ali, S. D.; Calhoun, T.; Kurtz, L. H. (Dept. Surgery, Howard Univ. Div., Washington, DC). *J. Natl. Med. Assoc.* 67(3):205-207; 1975.

0681 SURGICAL LESIONS OF THE COMMON HEPATIC DUCT WITH UNCOMMON COMPLICATIONS. (Pol.) Krysl, I. (Chirugicka klinika lekarske fakulty hygienicke KU, Praha 10, Poland). *Rozhl. Chir.* 54(5):303-305; 1975.

0682 CONGENITAL MALFORMATIONS OF THE EXTRAHEPATIC BILE DUCT SYSTEM. (Ger.) Muller, K.-H. G. (Zentral-Rontgeninstitut des Katharinenhospitals, D-7000 Stuttgart 1, Kriegsbergstr. 60 West Germany). *Leber Magen Darm* 5(1):13-17; 1975.

0683 ASPECTS OF TREATMENT: SPHINCTER PATENCY AND HEPATIC BSP UPTAKE AFTER BILIARY SPHINCTEROTOMY. (Eng.) Peel, A. L. G.; Devlin, H. B.; Ritchie, H. D. (London Hosp., London, England). *Ann. R. Coll. Surg. Engl.* 56(6):325-333; 1975.

0684 HEPATO-CHOLEDOCHAL CYST WITH DILATATION OF THE INTRAHEPATIC BILE DUCTS. (Fre.) Salembier, Y.; Grimbelle, A.; Houcke, M. (Clinique de le Louviere, 69, rue de la Louviere, F 59000 Lille, France). *Arch. Fr. Mal. App. Dig.* 64(1):59-63; 1975.

0685 THE TREATMENT OF CHOLELITHIASIS BY CHENIC ACID: PRESENT STATE OF A PROSPECTIVE STUDY. (Fre.) Van Waes, L.; De Weert, M.; Schurgers, M.; Beeckman, P.; Barbier, F.; Demeulenaere, L. (Sint-Antrieskliniek, Kromwalstraat 8, B-8880 Tielt, Belgique). *Acta Gastroenterol. Belg.* 38(1/2):24-33; 1975.

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0686 WATERHOUSE-FRIDERICHSEN SYNDROME DUE TO *Escherichia coli* IN THE COURSE OF A LITHIASIS CHOLANGITIS: REPORT OF A CASE. (Ita.) Maldacea, F.; Nisii, M. (Ospedale di S. Spirito in Sassia, III Divisione Medica, Italy). *Policlinico. Sez. Med.* 81(6):435-441; 1974.

0687 HEREDITARY BILIARY AND HEPATIC MALFORMATIONS. (Fre.) Bernard, M. J. P. (No affiliation given). *Bordeaux Med.* 8(7):737-742; 1975.

0688 CLINICAL SURVEY OF THE RESULTS OBTAINED WITH CHENODEOXYCHOLIC ACID THERAPY AND THE PROBLEM OF DOSAGE. (Ger.) Weis, H. J. (1st Med. Clin., Johannes-Gutenberg-Univ., 65 Mainz, Langenbeckstrasse 16, Germany). *Z. Gastroenterol.* 13 (suppl.):304-308; 1975.

See also, 0093, 0099, 0190, 0206, 0220, 0227, 0232, 0279, 0348, 0360, 0458, 0477, 0482, 0590.

GENERAL

0689 CHOLECYSTOKININ METABOLISM IN MAN AND DOGS. (Eng.) Thompson, J. C.; Fender, H. R.; Ramus, N. I.; Villar, H. V.; Rayford, P. L. (Univ. Texas Medical Branch, Galveston, TX 77550). *Ann. Surg.* 182(4):496-504; 1975.

A sensitive, specific, and reproducible radioimmunoassay for cholecystokinin (CCK) was developed with which basal levels of CCK of between 400-800 pg/ml were measured in patients with diabetes, duodenal ulcer disease, in normal subjects, and in normal dogs. After a meal, circulating levels of CCK rose to 1000-1200 pg/ml in human subjects. Release of CCK was more rapid in diabetic and duodenal ulcer patients than in normal subjects, but elevated postprandial levels persisted much longer in normal subjects. Patients with the Zollinger-Ellison syndrome had elevated values of cholecystokinin, which rose after a meal. Lack of correlation between elevated basal levels of gastrin and CCK in patients with the Zollinger-Ellison syndrome suggested that the hypercholecystokininemia may be absolute. The disappearance half-time of exogenous CCK was about 2.5 min in normal subjects as well as in diabetic and duodenal ulcer patients. In dogs, there was no uptake of basal levels of cholecystokinin by the kidney; on infusion of exogenous CCK-33, the kidney extracted 43% of the total CCK presented and 56% of the integrated CCK. It is concluded that: 1) circulating basal and postprandial levels of CCK may be measured in a reproducible fashion, 2) postprandial release of CCK is more rapid in diabetic and duodenal ulcer patients than in normal man, 3) the disappearance half-time of exogenous CCK in man and dogs is 2.5 min, and 4) the kidney is a major site for uptake of CCK.

0690 LOPERAMIDE ANTAGONISM OF CASTOR OIL-INDUCED DIARRHEA IN RATS: A QUANTITATIVE STUDY. (Eng.) Awouters, F.; Niemegeers, C. J. E.; Kuyps, J.; Janssen, P. A. J. (Janssen Pharmaceutica Res. Lab., B-2340 Beerse, Belgium). *Arch. Int. Pharmacodyn. Ther.* 217(1):29-37; 1975.

The occurrence of intestinal evaluations and the amount of body constituents lost in stools after a single administration of castor oil (1 ml) to fasting female Wistar rats, untreated rats, and rats pretreated with loperamide were studied. The time-course of castor oil-induced diarrhea in fasted rats was quantified by weighing stools every 15 min for 8 hr after the challenge and then after 24 hr. Diarrhea began within 1 hr as a series of rapidly occurring evacuations over 20-40 min. The mean weight of these stools was 5.7 g; later irregular evacuations increased the weight to 9.4 g at 8 hr. The area of individual time-weight diagrams had a median value of 432 U. Pretreatment with 0.16 mg/kg of loperamide significantly decreased the area of similarly obtained diagrams; 0.31 mg/kg caused a 50% reduction. It is suggested that this action of loperamide may involve reduction in the severity of inflammatory changes in the intestinal wall.

0691 THE ROLE OF INTESTINAL GAS IN FUNCTIONAL ABDOMINAL PAIN. (Eng.) Lasser, R. B.; Bond, J. H.; Levitt, M. D. (Veterans Admin. Hosp., 54th St. and 48 Ave. South, Minneapolis, MN 55417). *N. Engl. J. Med.* 293(11):524-526; 1975.

A washout technique with intestinal infusion of an inert gas mixture was used to study the relation of gas to functional abdominal symptoms. The volume of gas in the intestinal tract (176 ml) of 12 fasting patients with chronic complaints of excess gas did not differ significantly from that of 10 controls (199 ml). Similarly, there was no difference in the composition or accumulation rate of intestinal gas. However, more gas tended to reflux back into the stomach in patients who complained of abdominal pain during infusion of volumes of gas well tolerated by controls. Six patients with severe pain during the study had intestinal transit times of gas (40 min) that were significantly longer than those of the control group (22 min). The results indicate that complaints of bloating, pain, and gas may result from disordered intestinal motility in combination with an abnormal pain response to gut distention rather than from increased volumes of gas.

0692 THERAPEUTIC TRANSLUMINAL ARTERIAL EMBOLIZATION FOR BLEEDING IN THE UPPER PART OF THE GASTROINTESTINAL TRACT. (Eng.) Katzen, B. T.; McSweeney, J. (St. Vincent's Hosp. and Medical Center, New York, NY). *Surg. Gynecol. Obstet.* 141(4): 523-527; 1975.

e value of transluminal arterial embolization of bleeding site in the upper part of the gastro-testinal (GI) tract in two patients representing poor operative risk and in whom vasopressor thera- had failed was investigated. Case 1, a 39-yr- d man, presented with bright red hematemesis and lena. Aortogram revealed multiple areas of con- ast extravasation and selective hepatic arterio- aphy demonstrated considerable extravasation in e duodenal bulb and sweep. Selective superior senteric artery injection demonstrated bleeding om the site. Duodenotomy revealed two 3 cm cerations. Following gastroduodenal artery gation, vagotomy, and pyloroplasty the patient mained relatively stable, but slow oozing occurr- over the next 2-3 days. Subsequently, massive eeding began. Catheter perfusion of vasopressin .2 to 0.3 U/min) did not produce any significant ange in the extent of extravasation. After a 2 x mm piece of absorbable gelatin sponge was inserted perselectively into the inferior pancreaticoduo- nal artery, repeat angiograms demonstrated occlu- on of the inferior pancreaticoduodenal artery with further extravasation. Case 2, a 66-yr-old man, perienced an episode of massive hemorrhage in the per part of the GI tract 2 weeks after a right patic lobectomy for cholangiocarcinoma of the ver. Embolization of the left gastric artery th gelatin sponge was performed. There was an mediate cessation of bleeding, but 24 hr later, other massive hemorrhage in the upper part of the tract developed. Extensive subtotal gastrectomy s performed. The patient recovered from the GI eeding but subsequently developed hematobilia. peated selective arteriography failed to elucidate e site of bleeding; however, the catheter was left the common artery for subsequent vasopressin fusions. The authors conclude that transluminal bolization represents an alternative method in or-operative risk patients and in those cases ere vasopressor therapy has failed. Potential sks include intestinal ischemia and may vary with e anatomic site.

93 GASTRIC LESION IN DERMATITIS HERPETIFORMIS. (Eng.) O'Donoghue, D. P.; Lan- ster-Smith, M.; Johnson, G. D.; Kumar, P. J. . Bartholomew's Hosp., London, England EC1A , England). *Gut* 17(3):185-188; 1976.

ients (33, 24 men and 9 women) with dermatitis rpetiformis (DH) were studied with regard to stric morphology and pentagastrin stimulated d secretion. In addition, the sera of DH pa- nts and 30 healthy controls (14 men and 16 men) were screened for gastric parietal cell anti- ly by indirect immunofluorescence. Five of 33 ients had parietal cell antibody in their sera, ereas the antibody was not evident in 30 healthy trols of comparable age distribution. The tological and functional state of their gastric osa were studied in 15 of the patients. Atrophic tritis was found in all 5 whose sera contained tric parietal cell antibody and in 3 of 11 pa- nts with no antibody in their sera. In addition, re was marked impairment of acid secretion in DH group as a whole, but apart from one patient with overt pernicious anemia, there was no evidence of malabsorption of vitamin B_{12}. The results demonstrate an increased incidence of gastric parietal cell antibodies, confirming previous findings. However, the results differ with the usual female preponderance reported for this antibody as four of five patients with the antibody were men.

0694 PROTRACTED DIARRHEA AND MALNUTRITION IN INFANCY: CHANGES IN INTESTINAL MORPHOLOGY AND DISACCHARIDASE ACTIVITIES DURING TREATMENT WITH TOTAL INTRAVENOUS NUTRITION OR ORAL ELEMENTAL DIETS. (Eng.) Greene, H. L.; McCabe, D. R.; Merenstein, G. B. (Vanderbilt Univ. Sch. Medicine, Nashville, TN 37232). *J. Pediatr.* 87(5):695-704; 1975.

Two therapeutic regimens were compared in 16 infants with protracted diarrhea and malnutrition. Eight patients were treated with total parenteral nutrition (TPN) given via a central vein (group A); the remaining eight patients received a combination of dilute parenteral nutrients given in a peripheral vein plus continuous enteral feedings of an elemental diet (group B). All patients recovered, although two infants in group B were switched to TPN treatment after a poor response to the elemental diet. Intestinal biopsies were performed before treatment, after 2-3 weeks of TPN or elemental diet, and after 2-3 weeks of Nutramigen (containing sucrose, dextrose, glucose, vegetable oil, and casein hydrolysate) feedings. Before treatment, all patients had atrophic changes in the jejunal epithelium and deficient disaccharidase and trypsin activities. The second biopsy showed morphologic recovery in all patients, incomplete recovery of lactase and trypsin in both treatment groups, and complete recovery of sucrase and maltase activities only in group B patients. The third biopsy showed normal morphology and complete recovery of all enzymes measured. The mean number of hospital days was 46 ± 4.8 for group A and 34 ± 1.6 for group B ($p<0.05$), suggesting that patients given enteral feedings early tend to have a more rapid return of intestinal function and of some intestinal enzymes.

0695 NECROTIZING ENTEROCOLITIS IN LOW-BIRTH-WEIGHT INFANTS FED AN ELEMENTAL FORMULA. (Eng.) Book, L. S.; Herbst, J. J.; Atherton, S. O.; Jung, A. L. (Dept. Pediatrics, Univ. Utah, Salt Lake City, UT). *J. Pediatr.* 87(4):602-605; 1975.

A study was conducted in two groups of eight low-birth-infants (less than 1,200 g) to determine the nutritional efficacy as well as the incidence of necrotizing enterocolitis of a standard cow milk formula (0.8 cal/ml containing 2.8 g cow mild protein, 3.7 g corn oil, and 9.1 g sucrose and lactose per 100 ml) versus an elemental formula (0.67 cal/ml containing 2.2 g casein hydrolysate, 2.8 g medium-chain triglycerides, and 8.8 g glucose per 100 ml). The clinical status of the two groups was similar. Seven of eight infants fed the elemental formula and two of eight fed the standard cow milk formula developed necrotizing enterocolitis. The hypertonicity of the elemental diet may have contributed to the increased incidence of necrotizing enterocolitis in infants fed this formula.

0696 HUMAN REOVIRUS-LIKE AGENT AS THE MAJOR PATHOGEN ASSOCIATED WITH "WINTER" GASTROENTERITIS IN HOSPITALIZED INFANTS AND YOUNG CHILDREN. (Eng.) Kapikian, A. Z.; Kim, H. W.; Wyatt, R. G.; Cline, W. L.; Arrobio, J. O.; Brandt, C. D.; Rodriguez, W. J.; Sack, D. A.; Chanock, R. M.; Parrott, R. H. (Natl. Inst. Health, Bldg. 7, Bethesda, MD 20014). *N. Engl. J. Med.* 294(18):965-972; 1976.

A human reovirus-like agent was found in the stools of 42% of 143 infants and young children hospitalized with acute gastroenteritis between January 1974 and June 1975. The occurrence of the agent among parent contacts of the patients and the role of labile toxin-producing *Escherichia coli* in infantile gastroenteritis were also examined. Half the patients studied by electron microscopy and serologic techniques had evidence of infection with the agent. The infection had a seasonal pattern; 59% of those admitted during the cooler months (November-April) shed the agent, with a peak of 78% in December 1974 and January 1975, combined. None of the patients admitted during the warmer months (May-October) shed the agent. None of 275 *E. coli* isolates from 32 patients with diarrhea produced heat-labile enterotoxin, whereas 17 of the 32 had evidence of infection with the reovirus-like agent. In addition, 14 of 40 parents of 37 patients with diarrhea associated with the agent were also infected, but most infections were inapparent. This agent appears to be the major cause of diarrheal illness in children during the cooler months.

0697 SEROTONIN METABOLISM IN CHILDREN WITH KWASHIORKOR. (Eng.) Teotia, M.; Teotia, S. P. S. (L.L.R.M. Medical Coll., Meerut [U.P.], India). *Am. J. Clin. Nutr.* 28(11):1284-1288; 1975.

Intestinal fat absorption, serum 5-hydroxytryptamine (5-HT) level, and 24-hr urinary excretion of 5-hydroxyindoleacetic acid (5-HIAA) were studied in 13 children with kwashiorkor and in 10 matched (age, sex, socioeconomic strata) healthy controls. Eight of the 13 children with kwashiorkor who also had steatorrhea showed raised plasma serotonin levels in parallel with the high urinary excretion of 5-HIAA. In five children with kwashiorkor who showed normal intestinal fat absorption, the serum 5-HT and urinary 5-HIAA levels were comparable to controls. After therapy, concurrent with clinical and biochemical recovery, the intestinal absorption of fat improved and serum 5-HT concentration and the urinary excretion of 5-HIAA returned to normal range. This suggests that the deranged serotonin metabolism in these cases was secondary to the protein calorie deficiency.

0698 GASTROINTESTINAL INVOLVEMENT IN SYSTEMIC MASTOCYTOSIS. (Eng.) Ammann, R. W.; Vetter, D.; Deyhle, P.; Tschen, H.; Sulser, H.; Schmid, M. (Div. Gastroenterology, Univ. Zurich, Zurich, Switzerland). *Gut* 17(2):107-112; 1976.

Histamine levels were determined in the serum and gastric biopsy specimens of four consecutive patients with systemic mastocytosis to test the hypothesis that the presence of urticaria-like lesions associated with a high tissue histamine content is an important factor responsible for the gastrointestinal symptoms in many of these patients. One patient had a malabsorption syndrome with only minor histological changes of the intestinal mucosa. Another patient with ulcer diathesis had a gastric secretory pattern resembling Zollinger-Ellison syndrome. Serum gastrin and histamine levels were consistently normal in all patients. Endoscopy of stomach and colon disclosed urticarial-like papules either spontaneously or after topical provocation in all patients. No increase of mast cells was found in multiple mucosal biopsies. A markedly increased gastric tissue content of histamine was found, however, in the three patients studied. The findings suggest that urticaria-like lesions associated with a high tissue content of histamine may be more important than hyperhistaminemia in causing the various gastrointestinal symptoms.

0699 EFFECT OF UROGASTRONE IN THE ZOLLINGER-ELLISON SYNDROME. (Eng.) Elder, J. B.; Ganguli, P. C.; Gillespie, I. E.; Delamore, W. I.; Gregory, H. (Royal Infirmary, Manchester, England). *Lancet* 2(7932):424-427; 1975.

The effects of human urogastrone (0.25 μg/kg/hr i.v.) in four male patients (aged 22-40 yr) with Zollinger-Ellison syndrome (ZES) and in four healthy male control subjects (aged 26-42 yr) were investigated. Gastric juice aspirates, recordings of the skin temperature, radial pulse rate, and blood pressure were taken at 15-min intervals. Subjective comments on any discomforts felt by the patients before, during, and after urogastrone infusion were noted, as were general clinical observations of skin color, sweating, or restlessness. Urogastrone administration to ZES patients decreased gastric acid volume and concentration, and reduced basal acid output by 50-82%. The concentration of intrinsic factor and pepsin in gastric juice increased by 60-300%. Peak plasma gastrin concentration increased by 127-164% of basal concentration. A significant negative correlation between increase in plasma gastrin concentration and decrease in acid output was observed. No significant alteration in any clinical, hematological, or biochemical measurement was found during or after the urogastrone infusion in either the control or ZES subjects. The ZES patients had complete relief of ulcer pain shortly after the urogastrone infusion and this persisted for up to 24 hr. The authors conclude that urogastrone inhibits the endogenously stimulated acid hypersecretion in ZES.

0700 ACTION OF METIAMIDE, AN H_2-HISTAMINE RECEPTOR ANTAGONIST, IN PATIENTS WITH ZOLLINGER-ELLISON SYNDROME [Abstract]. (Eng.) Bonfils, S.; Corbic, M.; Mignon, M.; Accary, J. P.; Bernades, P. (INSERM U-10, Hosp. Bichat, F-75877 Paris Cedex 18, France). *Digestion* 11(5/6):436-463; 1974.

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See also, 0186, 0195, 0198, 0199, 0201, 0229, 0230, 0231, 0246, 0265, 0326, 0327, 0365, 0393, 0406, 0413, 0417, 0425, 0426, 0620.

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0752 HYDATID DISEASE TRANSMISSION IN CALIFORNIA: A STUDY OF THE BASQUE CONNECTION. (Eng.) Araujo, F. P.; Schwabe, C. W.; Sawyer, J. C.; Davis, W. G. (Sch. Veterinary Medicine, Univ. California, Davis, Calif. 95616). *Am. J. Epidemiol.* 102(4): 291-302; 1975.

0753 EPIDEMIOLOGICAL AND CLINICAL ASPECTS OF ECHINOCOCCOSIS IN EAST IRAN. (Eng.) Nassah, G. A.; Khadivi, B. (Meshed Univ. Medical Sch., Meshed, Iran). *J. Trop. Med. Hyg.* 78(6):120-122; 1975.

0754 ANTIHELMINTHIC CHEMOTHERAPY: INVESTIGATION OF THE EFFECTS OF LARVICIDES AND OVICIDES ON THE DEVELOPMENT OF PARASITIC INTESTINAL NEMATODES. (Por.) Goulart, E. G.; De Arruda, M. E.; Jourdan, M. C. (Dept. Parasitologia, Fed. Univ., Rio de Janeiro, Brazil). *Rev. Bras. Med.* 31(11): 791-794; 1974.

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0755 MANAGEMENT OF S. mansoni IN CHILDREN WITH HYCANTHONE: CLINICAL AND LABORATORY STUDY. (Por.) Huggins, D.; Marques, R. J.; Maciel, M. F.; Arraes, M. (Clinica de Doencas Infecciosas, Univ. Federal de Pernambuco, Pernambuco, Brazil). *Folha Med.* 69(5):507-509; 1974.

See also, 0211, 0212, 0442, 0494, 0536, 0721, 0729.

GENERAL

Regional Enteritis

0756 AN EVALUATION OF THE 'BREATH TEST' IN CROHN'S DISEASE. (Eng.) Lenz, K. (Div. Gastroenterology, Rigshospitalet, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 10(6):665-671; 1975.

The 1-(^{14}C)-glycine-glycocholic acid breath test was evaluated in 10 normal subjects and in 38 patients with Crohn's disease. Twenty-six had been subjected to ileal resection (10-180 cm), and 12 had not undergone surgery. Cecal resection or right-sided hemicolectomy was also performed on 20 patients and subtotal colectomy on 6. The ^{14}C-excretion in the breath was abnormally elevated in only 16 of the 38 patients with Crohn's disease. When ^{14}C-excretion in both breath and feces were combined, the test was found to be correlated with the activity of the disease in nonoperated cases, whereas all resected patients had bile acid malabsorption. It is concluded that the breath test is useless in Crohn's disease without concomitant measurement of the radioactivity in stools. The fecal ^{14}C-excretion was correlated with the extent of ileal resection and with the extent of colonic resection, whereas the ^{14}C-excretion in breath was independent of the type of operation performed. The breath test was found to be a more sensitive assay for ileal dysfunction than the duodenal bile acid concentration and the vitamin B_{12} absorption. No correlation with an elevated glycine/taurine ratio and an abnormal bacterial growth was found.

0757 IMMUNOLOGICAL STUDIES IN PATIENTS WITH CROHN'S DISEASE. (Eng.) MacPherson, B. R.; Albertini, R. J.; Beeken, W. L. (Dept. Pathology and Medicine, Medical Alumni Bldg., Univ. Vermont, Burlington, VT). *Gut* 17(2):100-106; 1976.

Immunological parameters were investigated in 38 patients with Crohn's disease using skin tests with dinitrochlorobenzene and a battery of common skin test antigens, lymphocyte transformation with phytohemagglutinin (PHA) and pokeweed mitogen, serum immunoglobulins, and absolute lymphocyte counts. Crohn's disease patients were divided into two groups, those treated and not treated with immunosuppressive drugs. The latter group was subdivided into patients with active and inactive disease. Immunosuppressed patients with Crohn's disease did not develop sensitivity to dinitrochlorobenzene and had mildly depressed skin test reactivity to common skin test procedures. Nonimmunosuppressed patients with active Crohn's disease also reacted less frequently to common skin test antigens, but 16 of 17 such patients developed sensitivity to dinitrochlorobenzene. Lymphocyte transformation with PHA and pokeweed mitogen was normal in all groups of patients with Crohn's disease. However, when suboptimal incubation periods were used with PHA stimulation, there was a significant difference between Crohn's disease patients and controls. Serum immunoglobulin levels and absolute lymphocyte counts were normal in all Crohn's disease patients. It is concluded that immunity in Crohn's disease is qualitatively normal.

0758 CARCINOMA COMPLICATING CROHN'S DISEASE: REPORT OF SEVEN CASES AND REVIEW OF THE LITERATURE. (Eng.) Lightdale, C. J.; Sternberg, S. S.; Posner, G.; Sherlock, P. (Memorial Sloan-Kettering Cancer Center, 1275 York Avenue, New York, NY 10021). *Am. J. Med.* 59(2):262-268; 1975.

Case reports are presented for seven patients with carcinoma complicating regional enteritis. The first three patients (men, aged 56, 53, and 49 yr, resp.) had carcinoma of the small intestine. All had diarrhea of long duration (23, 25, and 15 yr, resp.). The distal ileum and ascending colon were resected in the first patient, and an ileocolostomy was performed. Postoperatively he received 5-fluorouracil for adenocarcinoma. The terminal loops of the ileum and the mesentery were resected in the second patient and an end-to-end ileocolic anastomosis was performed. Pathological samples showed infiltrating adenocarcinoma of the ileum. Postoperatively he received prednisone and intermittent diphenoxylate hydrochloride with atropine sulfate. The last patient in this group had widespread malignant involvement of the gastrointestinal tract. After palliative surgery, he was treated with 5-fluorouracil. The last four patients (a woman and 3 men; aged 50, 30, 26, and 56 yr, resp.) all developed colonic adenocarcinoma with regional enteritis. Fistulas developed in two, and obstructions in two. The first patient received radiotherapy and abdominoperineal resection. The other three had resections of the diseased areas. No evidence of cancer was seen in three of the seven patients, 3, 6, and 7 yr after surgery, resp. No evidence of cancer was seen at autopsy in one patient 16 months after surgery. The remaining three cases had rapidly developing widespread intra-abdominal metastases. While these data do not inlicate a causal relation between regional enteritis and adenocarcinoma, early detection and resection of the cancer is stressed.

0759 DESTRUCTIVE MONARTHRITIS AND GRANULOMATOUT SYNOVITIS AS THE PRESENTING MANIFESTATIONS OF CROHN'S DISEASE. (Eng.) Frayha, R.; Stevens, M. B.; Bayless, T. M. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD). *John Hopkins Med. J.* 137(4):151-155; 1975.

Case reports of a 22-yr-old woman (case 1) and a 14-yr-old boy (case 2) with Crohn's disease with radiological evidence of altered articular cartilage and subchondral bone are presented. In case 1, radiographic examinations of the right hip showed narrowing of the joint space. A barium enema radiographic examination demonstrated nodular mucosal densities in the splenic flexure and transverse colon with loss of cecal haustrations. A small bowel radiographic examination showed fixation and increased bowel wall thickness in the ileocecal region. The radiologic findings were consistent with Crohn's disease. Prednisone (40 mg four times/day) and salicylazosulfapyridine (3 g four times/day) resulted in prompt symptomatic improvement. In case 2, radiographic examination of the left knee showed subchondral erosion of the lateral condyle. Histologically there was a diffuse synovitis with noncaseating granulomatous inflammation. A small bowel radiographic examination demonstrated distal ileal and cecal thickness and irregularity with a cobblestoned appearance of the terminal ileum. Progressive improvement followed chemotherapy. Thus, in both individuals where intestinal symptoms were not prominent, the development of monarthritis led to the discovery of the underlying inflammatory bowel disease. The presence of granulomata in the synovium suggests that the same process involved in granulomatous enteritis may also be responsible for some of the extraintestinal manifestations of Crohn's disease.

0760 THE LONG-TERM PROGNOSIS OF ILEORECTAL ANASTOMOSIS AND PROCTOCOLECTOMY IN CROHN'S DISEASE. (Eng.) Weterman, I. T.; Pena, A. S. (Univ. Hosp., Leiden, Netherlands). *Scand. J. Gastroenterol.* 11(2):185-191; 1976.

The long-term prognosis of ileorectal anastomosis and proctocolectomy in Crohn's disease was studied in 226 patients. Twenty-one of the 60 patients with almost total colonic involvement were treated by an ileorectal anastomosis between 1957 and 1973. Sixteen patients underwent a proctocolectomy between 1948 and 1972. Five of them had previously had an ileorectal anastomosis and were therefore included in both groups. The patients were followed up for a mean period of 8.3 yr. There was no surgical mortality in the group of ileorectal anastomosis, whereas in the group of proctocolectomy there was one early and one late postoperative death. The recurrence rate after ileorectal anastomosis was 75%, but 40% of these cases responded well to conservative treatment and have not required further surgery. The recurrence rate after proctocolectomy was 31%. The results concerning mortality, morbidity, and recurrence are compared with reports in the literature.

0761 FISTULAE IN CROHN'S DISEASE. (Cze.) Hledik, E.; Novak, J.; Nedbal, J.; Bohutova, J. (Radiodiagnosticka Klinika ILF, Praha 8-Bulovka, Czechoslovakia). *Cesk. Radiol.* 29(2):135-140; 1975.

0762 ROENTGENODIAGNOSIS OF CHRONIC ENTERITIS IN CHILDREN. (Rus.) Adamov, N. T.; Logutkina, S. P. (First Dept. Pediatrics, Ukrainian Inst. Postgraduate Training Physicians, USSR). *Radiol. Diagnos.* (3):22-26; 1975.

0763 CLINICAL EXPERIENCE IN MORBID CROHN'S DISEASE: REPORT FROM THE UNIVERSITY OF MUNICH SURGICAL CLINIC EXPERIENCE 1954-1974. (Ger.) Rueff, F.; Grabinger, A.; Bohmert, H.; Hemperl, D.; Hoffmann, K. (Surgery Clinic, Univ. Munich, Munich, Germany). *Munch. Med. Wochenschr.* 117(23):1009-1016; 1975.

0764 CONTROLLED CLINICAL TRIAL OF BRAN IN IRRITABLE BOWEL SYNDROME [Abstract]. (Eng.) Lyford, C.; Fisher, J.; Buers, B.; Rhodes, R.; Rhodes, J. B. (Univ. Kansas Medical Center, Kansas City, KS). *Clin. Res.* 23(3):253A; 1975.

0765 FREQUENCY AND NATURE OF CIRCULATING LYMPHOCYTOTOXINS (LCT) IN INFLAMMATORY BOWEL DISEASE (IBD) [Abstract]. (Eng.) Strickland, R. G.; Henderson, C. A.; Friedler, E. M.; Williams, R. C., Jr. (Univ. New Mexico Sch. Medicine, Albuquerque, NM). *Clin. Res.* 23(3):257A; 1975.

0766 FURTHER OBSERVATIONS ON THE TRANSMISSIBILITY OF CROHN'S DISEASE [Abstract]. (Eng.) Cave, D. R.; Mitchell, D. N.; Brooke, B. N. (St. George's Hosp., London, England). *Clin. Res.* 23(3):246A; 1975.

0767 DIAGNOSIS OF ATYPICAL INFLAMMATORY BOWEL DISEASE (IBD) BY RECTAL BIOPSIES AND MALABSORPTION STUDIES OF THE ILEUM "MSI" [Abstract]. (Eng.) Bright-Asare, P. (Moncton Hosp., Moncton, New Brunswick, Canada). *Clin. Res.* 23(3):246A; 1975.

0768 MAGNESIUM METABOLISM IN PATIENTS WITH CHRONIC INFLAMMATORY DISEASE OF THE BOWEL [Abstract]. (Eng.) LaSala, M. A.; Lifshitz, F.; Pergolizzi, R.; Silverberg, M.; Wapnir, R. A. (North Shore Univ. Hosp., Manhasset, NY 11030). *Clin. Res.* 23(3):459A; 1975.

0769 CLINICAL AND PATHOLOGICAL STUDY OF RECTAL LESIONS IN CROHN'S DISEASE. (Fre.) Yvergneaux, J. P.; Bauwens, E.; Yvergneaux, E. (Boulevard President Roosevelt 92, B-9000 Gent, Belgium). *Acta Gastroenterol. Belg.* 37(12):539-558; 1974.

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0770 CROHN'S DISEASE: CLINICAL AND STATISTICAL REMARKS AND THERAPEUTICAL CONSIDERATIONS ON 46 SURGICAL CASES. (Ita.) Simi, M.; Tuscano, D.; Miceli, F.; Cappello, G.; Arullani, A. (Univ. degli Studi di Roma, II Clinica Chirurgica, Rome, Italy). *Policlinico Sez. Chir.* 81(6):333-347; 1974.

See also, 0438, 0440, 0443, 0447, 0448, 0449, 0450.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

GASTROENTEROLOGY ABSTRACTS and CITATIONS is published monthly and includes citations and abstracts from the biomedical world literature as they are currently received. In addition, yearly cumulated subject and author indexes are published.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED$_{50}$	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
μg	microgram(s)
Hz	Hertz
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K$_m$	Michaelis constant
LD$_{50}$	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
μM	micromolar; micromole(s)
ma	milliampere(s)
mCi, μCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)
ml, μl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

)771 MORPHOGENESIS OF FETAL RAT DUODENAL VILLI.
(Eng.) Mathan, M.; Moxey, P. C.; Trier,
. S. (Harvard Medical Sch., Boston, MA 02115).
m. J. *Anat.* 146(1):73-92; 1976.

he histogenesis of villi from the primitive mucosa,
ined by undifferentiated epithelial cells, in the
uodena of 15-to 19-day-old Sprague-Dawley rat fetuses
as studied by light and electron microscopy. The
uodenal epithelium of 15- to 18-day-old fetuses was
tratified. Distinctive junctional complexes as-
ociated with membrane-bounded vesicles and cilia-
ike structures were seen in the deeper epithelial
ayers at 15 and 16 days. Small lumina, designated
secondary lumina," lined with a variable number of
icrovilli developed between epithelial cells at
hese junctional complexes during the 16th-18th
ays. Degenerative changes and exfoliation of
uperficial epithelial cells were obvious in 17-
nd 18-day-old fetuses. In 18-day-old fetuses, ag-
regates of mesenchyme invaginated the basal aspect of
he stratified epithelium. Concomitantly, the number
f epithelial layers overlying these mesenchymal pro-
ections was decreased. In 19-day-old fetuses, well
ormed, short duodenal villi lined by a single colum-
ar epithelium, which included goblet and endocrine
ells, were evident. Injection of ferritin into the
ain duodenal lumen of 17-day-old fetuses failed to
eveal continuity between the main duodenal lumen
nd the secondary lumina. However, continuity be-
ween many secondary lumina and the main lumen was
emonstrated in 18-day-old fetuses. Thus, major
rphological features associated with villus forma-
ion in fetal rat duodenum include: formation of
ny secondary lumina in primitive stratified
pithelium; eventual fusion of these lumina with the
in duodenal lumen, by their continued growth,
upled with exfoliation of degenerating super-
cial layers; and upward growth of mesenchyme to the
men, as cell exfoliation and expansion of secondary
mina take place.

72 THE EFFECTS OF PURE AND MICELLAR SOLUTIONS
OF DIFFERENT BILE SALTS ON MUCOSAL MORPHO-
GY IN RAT JEJUNUM IN VIVO. (Eng.) Keeling, J. W.;
mabadusuriya, S. P.; Harries, J. T. (John Radcliffe
sp., Headington, Oxford, England). *J. Pathol.*
8(3):157-163; 1976.

e effects of pure and micellar solutions of dif-
rent bile salts on mucosal morphology were inves-
gated in jejunum from Wistar rats, using a closed-
op technique. The effects of an anionic dihydroxy
eroid antibiotic, fusidic acid, were also studied.
cosal changes were assessed by light microscopical
pearances, and were quantified by determining
rface to volume ratios. The unconjugated dihydroxy
le salts, chenodeoxycholate and deoxycholate (DC),
oduced similar and gross structural changes at
ncentrations of 2.5-5 mM, as judged by mucosal
pearances, but not at 1 mM. The unconjugated tri-
droxy bile salt cholate and a variety of di- and trihydroxy conjugated salts produced no changes at concentrations of 5-20 mM. Fusidate (5 mM) produced changes similar to 5 mM DC. Compared with control values, DC (1, 2.5, and 5 mM) and fusidate (5 mM) produced highly significant ($p<0.001$) reductions in surface to volume ratios. DC-induced damage was completely abolished by mixed micellar solutions, whereas pure micellar solutions provided no protection. These results indicate that there is a molecular specificity for bile salt-induced mucosal damage and that the effects of the unconjugated dihydroxy species on mucosal structure depend not only on their intraluminal concentrations, but also on the relative concentrations of conjugated bile salts and lipids present in the lumen.

0773 SCANNING ELECTRON MICROSCOPY OF NORMAL RAT LIVER: THE SURFACE STRUCTURE OF ITS CELLS AND TISSUE COMPONENTS. (Eng.) Grisham, J. W.; Nopanitaya, W.; Compagno, J.; Nagel, A. E. H. (Univ. North Carolina Sch. Med., Chapel Hill, NC 27514). *Am. J. Anat.* 144(3):295-321; 1975.

Scanning electron microscopic (SEM) observations of hepatocellular structure and hepatic tissue organization of Wistar rats are reported. Hepatocytes presented three structurally distinct faces: the intercellular face containing flat surfaces and bile canaliculus, the sinusoidal face, and the connective tissue face that abuts portal tracts and hepatic veins. Hepatic parenchyma were segmented by the regular interdigitation of hepatic veins and portal tracts that ran perpendicularly between hepatic venous "limbs." Portal tract interiors afforded a view of ductal epithelial cells that contained frequent microvilli and occasional cilia. Microvilli were often concentrated in rows along the circumference of the ductal lumen. Hepatic arterial branches possessed relatively thick walls for their small size and longitudinally ridged endothelium that was sparsely studded with short, thick microvilli. Polyhedral and multifaceted hepatocytes, one cell thick, were penetrated by sinusoids (lacunae). Generally, the plates were straight and situated between neighboring portal and hepatic veins. Canaliculi (0.5 µm -1.0 µm in width) possessed microvilli crowded at their margins. Canalicular surfaces facing the cell body were smooth, containing only a few microvilli. Usually the canaliculi were located at the center of the hepatocellular plates, tending to be straight and unbranched. Connections between canaliculi and perisinusoidal spaces were not seen. The sinusoidal surface contained 25-50 microvilli/µm^2 and the endothelium was widely fenestrated by both large (1.0-3.0 µm in diameter) and small (0.1 µm) openings. The sinusoids were round or oval averaging 20-40 µm in diameter. Sinusoidal cells with plump, nonfestrated cytoplasm were suspected to be Kupffer cells. Terminal hepatic veins were usually two or three times the size of the sinusoids draining into them; however, the largest veins did not receive sinusoidal collagen. Portal and hepatic

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canals were lined with a nearly continuous layer of hepatocytes. The hepatic capsule was covered by a continuous layer of serosal cells studded with microvilli. Thus, SEM allows the visualization of surface characteristics and inter-relations of hepatocytes and hepatic plates, sinusoidal endothelial cells and sinusoids, presumed Kupffer cells, vessels, bile ducts, connective tissue, and the capsule of rat liver.

0774 IN VIVO ASSEMBLY OF TIGHT JUNCTIONS IN FETAL RAT LIVER. (Eng.) Montesano, R.; Friend, D. S.; Perrelet, A.; Orci, L. (Institut d'Histologie, Ecole de Medecine, 1211 Geneva, Switzerland). *J. Cell Biol.* 67(2):310-319; 1975.

The mode of formation of the basic detectable unit of the tight junction, the smooth-contoured fibril or ridge, was investigated electron microscopically in glutaraldehyde-fixed, freeze-fractured livers from 14- to 15-gestational day-old rat fetuses. Membrane particles aligned in otherwise poorly particulated areas of the presumptive pericanalicular plasma membrane (A face), frequently forming a discontinuous honeycomb network joining small particle islands. Contigous B-fracture faces contained furrows, rather than rows of pits, distinguishing the linear particle aggregates on the A face as developing tight junctions rather than gap junctions. Short segments of these linear arrays merged with smooth ridges, clearly identifiable as segments of discontinous tight junctions. Mature tight junction became fully identifiable with the continuing confluence of particulate and smooth ridge sections. By 21 days, most of the images of assembly had disappeared, and the structure was that of well-formed bile canaliculi sealed by mature tight junctions. It is concluded that the tight junctions form *de novo* by the aligment and fusion of separate particles into beaded ridges, which, in turn, become confluent and are transformed into continuous smooth ones.

0775 JUNCTIONS BETWEEN SINUSOIDAL ENDOTHELIAL CELLS IN FETAL RAT LIVER. (Eng.) Montesano, R. (Sch. Medicine, Univ. Geneva, 1211 Geneva 4, Switzerland). *Am. J. Anat.* 144(3):387-392; 1975.

A freeze-fracture study of the livers of 14-to 21-day rat fetuses demonstrated unusual patterns of intramembranous particles in regions of contact between sinusoidal endothelial cells. On the A fracture face, these arrays were mostly associated with linear elevations or crests. When the linear crests were lacking, the arrays appeared as parallel arrays of particles on flattened membrane faces. The particles in the arrays were approximately 9-11 nm in diameter and were usually separated by small intervals. These linear arrays may either represent a new type of junction or an abortive form of tight junction.

0776 EXTRACELLULAR CALCIUM AND THE ORGANIZATION OF TIGHT JUNCTIONS IN PANCREATIC ACINAR CELLS. (Eng.) Galli, P.; Brenna, A.; De Camilli, P.; Meldolesi, J. (CNR Center Cytopharmacology, Univ. Milan, 20129 Milan, Italy). *Exp. Cell. Res.* 99(1): 178-183; 1976.

The effect of extracellular calcium on the organization of tight junctions in pancreatic acinar cells was investigated in freeze-fracture studies. Guinea pig pancreas lobules were incubated in one of the following media: complete Krebs-Ringer bicarbonate solution (KRB); Ca^{2+}-free KRB; or Ca^{2+}-free KRB containing 0.5 mM EGTA. In the latter medium, the tight junctions were disarrayed after only 10 min incubation, and then broke up into fasciae occludentes. In lobules incubated for 60-120 min, the fasciae occludentes broke into fragments, which moved laterally in the plane of the plasmalemma and often located around the gap junctions. Interrupting the continuity of tight junctions resulted in the disappearance of different intramembranous particle density between the lateral and luminal regions of the plasmalemma. Similar findings occurred with lobules incubated in a Ca^{2+}-free medium without EGTA, but this disorganization was less marked. These results are consistent with the interpretation of tight junctions as dynamic structures and confirm that tight junctions might play a role in establishing and maintaining the regional differences of the plasmalemma.

0777 IDENTIFICATION OF CELLS WITH PANCREATIC-TYPE AND GUT-TYPE GLUCAGON IMMUNOREACTIVITY IN THE HUMAN COLON. (Eng.) Knudsen, J. B.; Holst, J. J.; Asnoes, S.; Johansen, A. (Bispebjerg Hosp., DK-2400 Copenhagen NV, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 83(6):741-743; 1975.

Ten normal human colon biopsy specimens from the anus of 5 young and middle-aged persons and 16 pancreatic specimens from 8 middle-aged patients were examined for the presence of glucagon cells with pancreatic-type and gut-type immunoreactivity. For comparison, pancreatic samples from normal Balb/c mice were also examined. Indirect immunofluorescence staining, indirect immunoperoxidase staining, and specific antisera against porcine glucagon coupled to bovine serum albumin were used to detect the glucagon immunoreactivity. Pancreatic glucagon cells in the islets of Langerhans were equally distinct, whether demonstrated by one or the other immunohistochemical techniques or by antisera in the human or the mouse pancreas. By all techniques, cells showing both types of glucagon immunoreactivity were demonstrated in the human colonic mucosa. On an average, 3.3 cells were found per crypt, mostly in the middle and deeper parts.

0778 CATECHOLAMINE-CONTAINING NERVE FIBRES IN THE HUMAN ABDOMINAL VAGUS. (Eng.) Lundberg, J.; Ahlman, H.; Dahlstrom, A.; Kewenter, J. (Univ. Goteborg, S-413 45 Goteborg, Sweden). *Gastroenterology* 70(3):472-474; 1976.

The presence of adrenergic nerve fibers in the human vagal nerve was investigated in specimens excised from six patients undergoing thoracic or abdominal surgery. The nerves were crushed 30-60 min before excision of a 10-mm segment above and below the crush, and the specimens were freeze-dried and prepared for fluorescent microscopy. The right anterior main trunk (subdiaphragmatic level), taken from one patient undergoing distal esophagectomy, and the anterior nerve of Latarget, taken from five patients undergoing selective vagotomy and pyloroplasty, contained unmyelinated nerve fibers with accumulations of green fluorescent material representing catecholamine. These observations indicate the presence of adrenergic nerve fibers running caudally in the human vagal nerve, similar to findings in other mammals.

0779 DIFFERENTIATION ASSOCIATED CHANGES IN THYMIDYLATE SYNTHETASE AND THYMIDINE KINASE ACTIVITIES IN INTESTINAL CELLS. (Eng.) Peterson, A. M. (Memorial Sloan-Kettering Cancer Center, New York, NY 10021). *Cell Differ.* 5(1):37-43; 1976.

Proliferative and mature intestinal cells of the jejunum and colon of male CFN rats,of human colon, and of the surface cells of human neoplastic colonic lesions were assayed for thymidylate synthetase and thymidine kinase activities. Cells from the proliferative region of rat jejunal mucosa were found to have higher enzyme activities than cells from the nonproliferative region. Thymidylate synthetase activity decreased as cells migrated from base to upper crypt, whereas thymidine kinase activity increased during crypt migration, and then declined as cells migrated onto villi. Thymidine kinase activity also remained elevated longer than thymidylate synthetase during cell migration in colonic mucosa of rat and man. High thymidine kinase:thymidylate synthetase ratios similar to those observed in flat mucosa before cells become fully mature were found in cells removed from expanding human neoplastic lesions. The results support, but do not confirm, the possibility that the enzyme activity profile reflects a specific stage of differentiation of the epithelial cells of the neoplasms.

0780 THE DEVELOPMENT OF THE GUINEA PIG GALLBLADDER EPITHELIAL CELLS. II. ELECTRON MICROSCOPIAL AND ENZYME-HISTOCHEMICAL INVESTIGATIONS. (Ger.) Wahlin, T.; Schiebler, T. H. (Histologische Abteilung, Universitat Umea, S-90187 Umea, Sweden). *Histochemistry* 44(3):253-275; 1975.

0781 ADRENERGIC NEURONS IN THE WALL OF THE SMALL INTESTINE: THEIR STRUCTURE AND DISTRIBUTION. (Rus.) Amvrosiev, A. P. (Inst. Physiology, Belorussian SSR Acad. of Sciences, USSR). *Dokl. Akad. Nauk Belorussk. SSR* 19(1): 85-88; 1975.

0782 THE AGING OF RAT LIVER AS REVEALED BY ELECTRON MICROSCOPIC MORPHOMETRY--I. BASIC PARAMETERS. (Eng.) Pieri, C.; Nagy, I. Zs.; Mazzufferi, G.; Giuli, C. (Gerontological Res. Dept., I.N.R.C.Z., Via Birarelli, 8, Ancona, Italy). *Exp. Gerontol.* 10(5):291-304; 1975.

0783 LIVER MELANOSIS IN A GOLDEN HAMSTER WITH MELANOMA (AN ELECTRON-MICROSCOPIC AND HISTOCHEMICAL STUDY). (Eng.) Oberman, B.; Belicza, M.; Krstulovic, B. (Faculty Medicine, Zagreb, Yugoslavia). *Acta Med. Iugosl.* 29(2): 157-164; 1975.

0784 COMPARATIVE ELECTRON MICROSCOPIC STUDIES ON THE PRETERMINAL AND TERMINAL FIBRES OF THE NERVE PLEXUSES OF THE SMALL INTESTINE, EMPLOYING DIFFERENT FIXATION METHODS. (Eng.) Feher, E.; Csanyi, K.; Vaida, J. (Semmelseis, Univ. Medical Sch., 1450 Budapest, Hungary). *Acta Morphol. Acad. Sci. Hung.* 22(2):147-159; 1974.

0785 EXAMINATION OF THE RETICULOENDOTHELIAL SYSTEM IN RAT LIVER AND SPLEEN WITH THE SCANNING ELECTRON MICROSCOPE. (Ger.) Frenzel, H.; Richter, I.-E.; Hucker, H. (No affiliation given). *Zentralbl. Allg. Pathol.* 119(4):322; 1975.

See also, 0828, 0842, 0847, 0935, 0936, 0951, 0955, 1063, 1243, 1285, 1439.

ABSORPTION · EXCRETION · TRANSPORT

786 AN ANALYSIS OF THE D-GLUCOSE INFLUX KINETICS OF IN VITRO HAMSTER JEJUNUM, BASED ON ONSIDERATIONS OF THE MASS TRANSFER COEFFICIENT. Eng.) Dugas, M. C.; Ramaswamy, K.; Crane, R. K. Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15213). *iochim. Biophys. Acta* 382(4):576-589; 1975.

he effects of unstirred layers on the apparent glu- ose-influx kinetics of hamster jejunum were studied. he apparent maximum velocity, V, was 12.81, 10.71, .75, 10.17, and 9.33 μmol/cm^2/hr while the apparent ichaelis constant for glucose influx, K_m, was 7.42, .95, 1.87, 0.93, and 0.5 mM, resp., when the rate of shaking the incubation flasks was 40, 80, 120, 160, and 200 cycles/min, resp. Extrapolation of the slope and reciprocal intercept of Lineweaver-Burke plots of the data to infinite shaking rate was mathematically justified to yield the slope and intercept of a Lineweaver-Burke plot uncomplicated by unstirred layers. These extrapolations had a regression coefficient of 1 when plotted as (intercept)$^{-1}$ or slope=$b_0+b_1b-(\text{shake})^2$ where b=2.764 for the slope plot and 6.626 for the (intercept)$^{-1}$ plot. From these values of b_0, K_m, and V were determined as 0.41 and 9.35, resp. These values should represent the true kinetic parameters for glucose influx into this tissue under the experimental conditions em-

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ployed. Values of the theoretical flux expected on a basis of unstirred-layer thickness calculated from the relation C_b (for $J = V/2$) $= K_m + 0.5V/K_d$ agreed with the experimental values of J in some instances but the 95% confidence interval of the theoretical and experimental values did not overlap in many instances at low shaking rates and low concentrations of glucose. A factor θ representing the error between the theoretical and experimental values was found to fit the relationship ln(theoretical J) = $-3.8 + 5.77\ (1/\theta)$ with a regression coefficient of 0.98 and was proposed to be due to one or more of the following parameters: a villus tip to base gradient of transport (influx) activity; a dependence of brush-border influx area on substrate concentration in the bulk incubation media; and an end product inhibition of the overall transport rate. The data indicate that the flux of glucose across the unstirred layer is ordinarily the rate-limiting step in the *trans*-brush border transport of this sugar by hamster jejunum when less than saturating concentrations of glucose are used. At high shaking rates the contribution of the unstirred layer is reduced.

0787 CIRCADIAN RHYTHMS OF INTESTINAL SUCRASE AND GLUCOSE TRANSPORT: CUED BY TIME OF FEEDING. (Eng.) Stevenson, N. R.; Fierstein, J. S. (Rutgers Medical Sch., Piscataway, NJ 08854). *Am. J. Physiol.* 230(3):731-735; 1976.

Changes in the activity patterns and the daily average levels of activity of sucrase and the absorptive transport system for glucose were studied in male Sprague-Dawley rats subjected to artificial feeding schedules. Under constant illumination, the activities of sucrase and the absorptive transport system for glucose followed circadian rhythms on both ad libitum and controlled feeding regimens. In the ad libitum group, sucrase and transport activities were higher during the early morning and lower during the early evening. In response to controlled feeding at 1400-1800 hr, sucrase activity peaked at 1300 hr and was at a minimum at 0500 hr. Transport activity peaked at 1700 hr and was at a minimum at 0700 hr. When the feeding period was changed to 0200-0600 hr, the rhythms shifted by 12 hr. Restriction of feeding also resulted in an enhanced average daily activity level for both functions over the ad libitum group. It is concluded that the rhythms of these functions result from feeding patterns of previous days.

0788 INFLUENCE OF SPECIFIC DIETARY SUGARS ON THE JEJUNAL MECHANISMS FOR GLUCOSE, GALACTOSE, AND α-METHYL GLUCOSIDE ABSORPTION: EVIDENCE FOR MULTIPLE SUGAR CARRIERS. (Eng.) Debnam, E. S.; Levin, R. J. (Royal Free Hosp. Sch. Medicine, 8 Hunter St., London, WC1 1BP, England). *Gut* 17(2): 92-99; 1976.

The effects of feeding glucose, galactose, and α-methyl glucoside on the kinetics of absorption of these sugars in the jejunum of fasting albino male Sheffield rats were assessed by chemical and electrical methods for characterizing the electrogenic active transfer mechanisms *in vivo*. The parameters of apparent K_m (an index of carrier affinity) and V_{max} (an index of the maximum jejunal transfer capacity) were obtained from the kinetic data to describe quantitatively the active transport mechanisms in rats fed their normal solid diet, in rats deprived of solid food for 3 days, and in rats deprived of solid food but allowed *ad libitum* access to isotonic solutions of glucose, galactose, or α-methyl glucoside for up to 3 days. Feeding the sugars to fasting rats produced complex differential effects on the apparent K_m's and V_{max}'s of the various transport mechanisms. The changes were explained by alterations in the transport mechanisms rather than by nonspecific changes in intestinal morphology or metabolism. The differential effects induced by the feeding sugars support the concept that jejunal enterocytes possess multiple carriers or mechanisms for the absorption of actively transported sugars *in vivo*. The multiple forms of the sugar carriers may be involved in the facultative responses of the enterocytes to changes in the dietary levels of sugar and may be important in understanding the influences of disease and nutritional status on absorption processes in man.

0789 INTESTINAL UPTAKE OF MACROMOLECULES. IV. THE EFFECT OF PANCREATIC DUCT LIGATION ON THE BREAKDOWN OF ANTIGEN AND ANTIGEN-ANTIBODY COMPLEXES ON THE INTESTINAL SURFACE. (Eng.) Walker, W. A.; Wu, M.; Isselbacher, K. J.; Bloch, K. J. (Massachusetts General Hosp., Boston, MA 02114). *Gastroenterology* 69(6):1223-1229; 1975.

The possible role of pancreatic enzymes in the degradation of antigens and antigen-antibody complexes on the surface of the small intestine was investigated in adult female Sprague-Dawley rats. Groups of six rats were immunized by i.p. injection of crystalline bovine serum albumin (BSA) labeled with $Na^{125}I$ emulsified in incomplete Freund's adjuvant (IFA). Control rats were injected i.p. with equal volumes of saline and IFA. There was significantly less breakdown of $[^{125}I]$BSA by both jejunal and ileal gut sacs from BSA immunized, pancreatic duct-ligated rats compared with BSA sham-operated controls. Treatment of the immunized, pancreatic duct-ligated rats with pancreatic extracts prior to removal of the gut sacs, led to an increase in the breakdown of $[^{125}I]$BSA by the gut sacs *in vitro*. These findings suggest that pancreatic enzymes adsorbed to the surface of the intestine contribute to the proteolysis of antigens and antigen-antibody complexes at this site.

0790 UPTAKE OF MACROMOLECULES BY ENTEROCYTES ON TRANSPOSED AND ISOLATED PIGLET SMALL INTESTINE. (Eng.) Leary, H. L., Jr.; Lecce, J. G. (Animal Science Dept., North Carolina State Univ., Raleigh, NC 27607). *J. Nutr.* 106(3):419-427; 1976.

The effect of digesta on enterocyte closure (cessation of internalizing of fluorescent protein) as it relates to the position of the enterocyte in the digestive path of the neonatal piglet was studied by either surgically transposing a portion of the ileum to the proximal third of the small intestine or isolating different regions of the small intestine from the direct digestive path. Transposition experiments illustrated that the neonatal piglet possesses a differentiated intestinal epithelium with regard to its capacity to internalize macromolecules; enterocytes on ileum surgically transposed to the proximal intestine continued to internalize fluorescent protein after enterocytes on the proximal intestine on each side of the transposed ileum ceased. Upon isolation from the direct digestive pathway, enterocytes on intestinal segments from the proximal, middle, and distal thirds of the small intestine internalized fluorescent protein longer than comparable enterocytes remaining in the digestive path. It is concluded that digesta accelerates the rate of termination of the differentiated capacity of the neonatal piglet intestinal epithelium to internalize macromolecules.

0791 QUANTITATIVE ASSESSMENT OF THE TRANSMISSION OF LABELLED PROTEIN BY THE PROXIMAL AND DISTAL REGIONS OF THE SMALL INTESTINE OF YOUNG RATS.

(Eng.) Morris, B.; Morris, R. (Dept. Zoology, Univ. Nottingham, Nottingham NG7 2RD, England). *J. Physiol. (Lond.)* 255(3):619-634; 1976.

The amount of labeled protein transmitted from the proximal and distal regions of the small intestine was measured in Wistar rats by determining the rate at which labeled (^{125}I) immunoglobulin G (IgG) left the vascular compartment, the rate of catabolism of labeled IgG, and the distribution of radioactivity in certain abdominal organs. The plasma volume in rats aged 15-16 days was measured by dilution analysis using homologous labeled IgG. A mean plasma volume of 5.53 ml/100 g and a mean blood volume of 8.01 ml/100 g were obtained. After the injection of labeled IgG into the heart, homogenates of various abdominal organs and of the carcass were prepared. Labeled immunoglobulin G left the vascular compartment at a rate of 9-10%/hr over a 3-hr period. About 11% of the labeled IgG was catabolized in 2 hr. These data were used to make quantitative estimates of the amount of intact IgG transmitted from the proximal intestine and from the ileum after the intraintestinal injection of 1,000 μg of labeled IgG. Homogenates of the animals were prepared, and it was estimated that over 40% of the labeled IgG was transmitted as intact protein from the proximal tissue. The results suggest that no intact IgG was transmitted from the ileum, but about 15% of the protein removed from the ileum was recovered in the whole body as degraded fragments precipitable with trichloroacetic acid. These observations are discussed in the context of the transmission of antibodies, and their relevance to the receptor hypothesis is considered.

0792 CHARACTERISTICS OF RAT JEJUNAL TRANSPORT OF TRYPTOPHAN.

(Eng.) Munck, B. G.; Rasmussen, S. N. (Inst. Medical Physiology A, Juliane Maries Vej 28, 2100 Copenhagen O, Denmark). *Biochim. Biophys. Acta* 389(2):261-280; 1975.

The parameters of rat jejunal transport of tryptophan, the interactions between tryptophan and lysine or methionine, and some aspects of the *trans* effects of cellularly accumulated amino acids were studied. The influx of tryptophan across the jejunal brush border ($J_{mc}{}^{Trp}$) could be accounted for by the carrier of α-aminomonocarboxylic acids alone. Tryptophan competed with lysine for the carrier of basic amino acids across the brush border membrane without itself being transported by this carrier. Lysine had neither *cis* nor *trans* effects on $J_{mc}{}^{Trp}$; whereas, intracellular tryptophan was highly inhibitory to $J_{mc}{}^{Lys}$. The intracellular concentration of lysine and of tryptophan, $[Lys]_c$ and $[Trp]_c$, were unaffected by tryptophan and lysine, resp., although the transmural fluxes, from the mucosal side to the serosal side of lysine, ($J_{ms}{}^{Lys}$) and of tryptophan, ($J_m{}^{Trp}$) were inhibited by tryptophan and lysine, resp. The latter effects inhibited interactions at the basolateral membrane. Methionine was a potent *cis* and *trans* inhibitor of $J_{mc}{}^{Trp}$, but stimulated $J_{ms}{}^{Trp}$ and reduced $[Trp]_c$. Methionine caused *trans* acceleration of the influx of lysine across the brush border membrane, $J_{mc}{}^{Lys}$. but had no effect on the influx of galactose, $J_{mc}{}^{Gal}$. Leucine caused *trans* inhibition of $J_{mc}{}^{Leu}$. Tryptophan did not cause *cis* inhibition of $J_{mc}{}^{Gal}$, but was a strong *trans* inhibitor of $J_{mc}{}^{Gal}$. Cellularly accumulated tryptophan appeared to accelerate the eventual decline in transepithelial potential difference and short-circuit current. The results indicate that tryptophan is transported across the brush border membrane by the carrier of neutral amino acids alone, but leaves the cell across the basolateral membrane by a mechanism used by lysine also. They also indicate that leucine, methionine, and probably tryptophan have a *trans* effect on the transport of neutral amino acids across the brush border membrane which may represent decelerating exchange diffusion and that cellulary accumulated tryptophan has a strong and indiscriminate depressive effect on all transport function of rat jejunal epithelium.

0793 MECHANISM OF ACTION OF ASPIRIN ON CANINE GASTRIC MUCOSA.

(Eng.) Kuo, Y. J.; Shanbour, L. L. (Univ. Texas Medical Sch., Houston, TX 77025). *Am. J. Physiol.* 230(3):762-767; 1976.

To determine whether permeability or inhibition of active transport is the primary action resulting from exposure of canine gastric mucosa to aspirin, tissue electrical resistance was measured *in vivo* and ion fluxes were measured *in vitro*. In an *in vivo* chambered canine stomach preparation, exposure of the gastric mucosa to 5, 10, and 20 mM aspirin (pH 3.0) resulted in a decrease in electrical potential difference (PD) and in an increase in resistance (R) within 30 min. *In vitro*, exposure of the mucosal side of the isolated canine gastric mucosa to 5, 10, and 20 mM aspirin (pH 3.0) for 1 hr or of 1 mM aspirin (pH 3.0) for longer than 1 hr resulted in marked permeability changes, i.e., increases in the unidirectional fluxes of Na^+ and Cl^-, as well as inhibition of net ion fluxes. These concentrations of nonionized aspirin (pH 3.0) also reduced the R and PD. However, 1 mM aspirin (pH 3.0) or 20 mM ionized aspirin (pH 7.4) depressed the active transport of ion, in-

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creased R, but did not increase the ionic permeability. Mucosal ATP content was reduced by mucosal instillation of aspirin (pH 3.0). These results demonstrate that the initial action of aspirin, inhibition of ion transport, is followed by an increase in permeability.

0794 EFFECTS OF CHOLECALCIFEROL ON THE TRANSLOCATION OF CALCIUM BY NON-EVERTED CHICK ILEUM IN VITRO.

(Eng.) Holdsworth, E. S.; Jordan, J. E.; Keenan, E. (Dept. Biochemistry, Univ. Tasmania, Hobart, Tasmania 7001, Australia). *Biochem. J.* 152(2):181-190; 1975.

The translocation of Ca^{2+} by white crossbred (Leghorn X Australorp) chick ileum and the effect of pretreatment with cholecalciferol (400 IU) was investigated in an apparatus that allowed perfusion of a noneverted segment of intestine *in vitro*. Krebs-Ringer bicarbonate containing 10 mM glucose, 1 mM Ca^{2+}, and 1 mM P_i was used as a standard physiologic medium and the transport of Ca^{2+} was calculated from the changes in radioactivity of ^{45}Ca. The changes in Ca^{2+} of the perfusion fluids measured by atomic absorption was insignificant, but tissues actually lost Ca^{2+} to the medium during the 30 min of perfusion. Pretreatment with cholecalciferol *in vivo* increased the permeability to Ca^{2+} of the microvillus of the cell in either direction (lumen to cell or cell to lumen). This increased transport can be partially mimicked by 1 mM sodium dodecyl sulfate added *in vitro*. The sign and the magnitude of the electrical potential difference prevailing across the ileum did not influence Ca^{2+} transport. Exit of Ca^{2+} from the mucosal cell was temperature-sensitive, requiring metabolic energy and Na$^+$. Pretreatment with cholecalciferol caused increased movement of Ca^{2+} out of the cell across the basement membranes. This effect was markedly increased by the presence of dicyclohexylcarbodi-imide (0.1 mM) in the perfusion fluid. These observations suggest that cholecalciferol increases Ca^{2+} entry and exit at the mucosal surface and also causes Ca^{2+} to be more available to the pump at the serosal surface.

0795 EFFECT OF DIURETICS ON INTESTINAL TRANSPORT OF ELECTROLYTES, GLUCOSE, AND AMINO ACID.

(Eng.) Huang, K. C.; Dinno, M. A.; Gelbart, D. R. (Univ. Louisville Health Sciences Center, Louisville, KY 40201). *Proc. Soc. Exp. Biol. Med.* 151(4):779-784; 1976.

The effects of ethacrynic acid (EA), furosemide, and amiloride on the electrical properties and ion, glucose, and amino acid transport of the jejunal mucosa of Swiss-Webster albino mice were studied *in vitro*. The membrane was bathed in Krebs-Ringer solution with or without glucose. When EA, furosemide, or amiloride was added to the bathing fluid of both sides, a transient increase followed by a decrease of both potential difference and short circuit current were observed. In glucose-containing bathing medium, EA inhibited both net Na and Cl flux and residual flux; however, EA had little effect on both Na and Cl flux in glucose-free bathing medium. Studies using everted intestinal sac technique showed that EA inhibited both glucose and L-tyrosine across the mucosal membrane against concentration gradients. Furosemide and amiloride were less potent than EA in inhibiting the Na and Cl flux when the bathing solution contained glucose. But they had no effect on glucose and L-tyrosine transport across the intestinal mucosa. Furthermore, they did inhibit Cl flux even in glucose-free bathing medium. It is postulated that all three diuretics act on the brush-border membrane of the intestine. EA probably inhibits the Na-glucose cotransporting system; furosemide and amiloride inhibit the simple diffusion process of Na entry or Cl exit by decreasing the conductance of the membrane.

0796 PATHWAY OF SODIUM MOVING FROM BLOOD TO INTESTINAL LUMEN UNDER INFLUENCE OF OXYPHENISATIN AND DEOXYCHOLATE.

(Eng.) Nell, G.; Forth, W.; Rummel, W.; Wanitschke, R. (Institut fur Pharmakologie und Toxikologie, Universitat des Saarlandes, D-6650 Homburg (Saar), Federal Republic of Germany). *Naunyn-Schmiedebergs Arch. Pharmacol.* 293(1):31-37; 1976.

The pathway of sodium from blood to intestinal lumen was studied in female Wistar rats treated with deoxycholate (D) or oxyphenisatin (O). The transfer of ^{51}CrEDTA and inulin across the rat colonic mucosa *in vivo* was increased by O (3.5×10^{-5} M) and D (3×10^{-3} M). O and D did not change the size of the intra- and extracellular fluid compartments of the mucosa as measured with ^{51}CrEDTA from the blood side. The sodium and potassium content of the mucosal tissue was not altered and the intracellular concentrations of sodium and potassium remained constant. The time course of the ^{22}Na uptake into the mucosal epithelium was not influenced by O and D up to 5 min after i.v. injection. The specific activity of sodium, however, in the luminal fluid increased under the influence of O (twofold) and D (fivefold). The uptake of ^{22}Na into the mucosal tissue after administration of ^{22}Na into the intestinal lumen was not changed in the presence of O and D. It is concluded that the net transport of sodium and water from blood to lumen under the influence of O and D occurs mainly via the intercellular way.

0797 THE EFFECT OF SODIUM TAUROCHOLATE ON THE PERMEABILITY OF ANTRAL AND FUNDIC GASTRIC MUCOSA.

(Eng.) Birkett, D. H.; McColl, I. (Boston City Hosp., 818 Harrison Ave., Boston, MA 02118). *J. Surg. Res.* 20(3):157-161; 1976.

The effect of sodium taurocholate on the permeability of antral and fundic gastric mucosa was studied *in vitro*. A preparation of rabbit antral and fundic gastric mucosae was mounted in an Ussing chamber and perfused with a physiological bicarbonate solution at 37 C. Permeability was measured by the transmucosal flux of [^{14}C]erythritol. Sodium taurocholate (20 mM) at pH 7.4 in the mucosal solution did not increase the flux of erythritol across fundic tissue when compared to controls but did cause a significant fall in tissue resistance. However, sodium taurocholate (20 mM) at pH 7.4 in the mucosal solution of antral tissue increased the flux of erythritol after 30 min when compared with controls, 2.23 and 0.68 pmol/cm^2/sec, resp., and caused a significant fall in tissue resistance. At pH 2.5, sodium taurocholate (2 mM) in the mucosal solution increased the flux of erythritol across fundic tissue when compared with controls, 5.73 and 0.82 pmol/cm^2/sec, resp., and statistically reduced tissue resistance. In antral tissue sodium taurocholate (2 mM) at pH 2.5 increased erythritol flux across antral tissue when compared with controls, 13.97 and 1.38 pmol/cm^2/sec, resp., and statistically reduced tissue resistance. In treated mucosa the slope of the regression of flux against time was significantly greater in antral than fundic tissue, indicating greater antral mucosal permeability. At both high and low pH the increase in physical permeability caused by taurocholate was greater in antral than fundic mucosa. The greater permeability of the antral compared to the fundic tissue suggests that the antrum is more susceptible to injury.

0798 USE OF AN ELEMENTAL DIET IN ANIMALS DURING TREATMENT WITH 5-FLUOROURACIL (NSC-19893). (Eng.) Bounous, G.; Maestracci, D. (Centre Hospitalier Universitaire, Sherbrooke, Quebec, Canada J1H 5N4). *Cancer Treat. Rep.* 60(1):17-22; 1976.

The systemic nutritional effects of 5-fluorouracil (5-FU) enteropathy and its possible mitigation by dietary management were investigated in male Wistar rats. Rats fed a diet containing casein hydrolysate (10% weight/weight, diet 3), instead of whole casein (diet 1) exhibited increased tolerance to nine consecutive daily injections of 15 mg/kg of 5-FU. The relative nutritional efficiency of diet 3 was significantly higher during 5-FU treatment. Serum albumin levels measured after 5-FU treatment dropped by only 2.7% in diet 3 groups and by 13.5% in diet 1 groups. Serum albumin values for rats on the control diet were comparable to those on diet 1. No 5-FU-related mortality was observed in any of the groups. Intestinal brush border enzymes were determined in a group of rats on diet 1. At the end of 5-FU treatment, statistically significant changes were observed: sucrase dropped to 30% of control, and leucylnaphthylamide-hydrolyzing activity dropped to 19% of control. The activity of γ-glutamyltransferase did not change significantly. The authors suggest under these circumstances, a mixture with a prevalence of free amino acids (casein hydrolysate) may be more readily absorbed than a corresponding mixture containing a larger proportion of oligopeptides.

0799 EFFECT OF NON-IONIC DETERGENTS ON THE ABSORPTION OF OLEIC ACID IN THE ANAESTHETISED RAT. (Eng.) Sheltawy, M. J.; Losowsky, M. S. (St. James's Hosp., Leeds L 59, 7TF, U.K.). *Biomedicine* 22(6):468-472; 1975.

The effects of bile salts and of Tween 80 and Pluronic F68 (nonionic detergents) on the absorption and esterification of oleic acid (in presence of monoglyceride) by loops of female Wistar rat intestine were studied *in vivo*. Absorption of oleic acid was highest from 10 mM taurocholate, but was also substantial from the nonionic detergents. Tween 80 acted synergistically with low concentrations of bile salts. Most of the absorbed fatty acid recovered in the intestinal wall was esterified, the proportion found as triglyceride being greater when a nonionic detergent was present. A much smaller proportion of radioactive label left the intestine after absorption from 10 mM taurocholate than from 2 mM taurocholate or from the nonionic detergents. The experiments indicate that in low concentrations Tween 80 and Pluronic F68 may improve the absorption of fatty acids previously impaired due to bile salt deficiency.

0800 TREATMENT WITH GLUCAGON-BINDING ANTIBODIES ALTERS THE INTESTINAL RESPONSE TO STARVATION IN THE RAT. (Eng.) Rudo, N. D.; Lawrence, A. M.; Rosenberg, I. H. (Dept. Medicine, Univ. Chicago, Chicago, IL). *Gastroenterology* 69(6):1265-1268; 1975.

Plasma glucagon levels were determined in diabetic and starved Sprague-Dawley male rats by a double antibody radioimmunoassay. In addition, the effect of treatment with glucagon-binding antibodies in partially starved animals was studied to determine why everted intestinal rings from these animals accumulate nonmetabolizable 1-amino-cyclopentane-5-carboxylic acid (ACPC) at an enhanced rate. When serum glucagon levels were measured in rats 5 days after experimental induction of diabetes with alloxan (150 mg/kg, i.p.) or streptozotocin (65 mg/kg, i.v.), and in rats that were partially starved for 6 days, both groups exhibited increased serum glucagon levels, when compared to controls. Treatment with glucagon-binding antibody (0.5 ml, every 8 hr for 4 days) significantly decreased, towards normal, the ability of intestine from partially starved animals to accumulate ACPC ($p<0.05$). These data suggest that hyperglucagonemia influences the intestine of partially starved rats to augment intestinal transport. The observed changes in intestinal transport function may represent a new population of epithelial cells either changed in number or altered quantitatively by a prolonged exposure to increased serum glucagon levels.

0801 INTERACTIONS OF CATIONIC BILE SALT DERIVATIVES WITH THE ILEAL BILE SALT TRANSPORT SYSTEM. (Eng.) Firpi, A.; Walker, J. T.; Lack, L. (Duke Univ. Medical Center, Durham, NC 27710). *J. Lipid Res.* 16(5):379-385; 1975.

A series of cationic bile salt derivatives (cholamine conjugates) were prepared with one, two, and three α-hydroxyl groups on the steroid moiety and these compounds were examined for active transport across intestinal mucosa in incubations of everted sacs from each of the four quarters of guinea pig small intestine. No such active transport occurred,

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but these sacs did actively transport taurocholate. The compounds inhibited active transport of taurocholate, taurodehydrocholate, and taurochenodeoxycholate. Lithocholylcholamine (one hydroxyl group) was the most effective inhibitor, with 50% inhibition at 0.20 μmol/ml. Cholylcholamine was the least effective inhibitor. The ability of deoxycholylicholamine to inhibit the transport of taurodehydrocholycholamine was approximately twice (0.17 μmol/ml) the potency observed when taurocholate was used as the test substrate. *In vivo* perfusion experiments demonstrated that deoxycholylcholamine (0.15 mg/ml) reversibly inhibited the transport of sodium taurodehydrocholate (0.15 mg/ml) across the guinea pig ileal mucosa. When the concentration of deoxycholylcholamine was raised to 0.30 mg/ml, there was an initial depression in the rate of taurodehydrocholate transport followed by a subsequent increase above the control level, which was interpreted as reflecting an alteration of membrane permeability. Inhibition of taurocholate absorption was less pronounced than that of taurodehydrocholate. The trihydroxy compound was a less effective inhibitor that either of the two dihydroxy compounds tested. In a liver perfusion experiment, 98% of the infused taurodehydrocholate was recovered, and this was not affected by the simultaneous infusion of an equal concentration of deoxycholylcholamine. *In vivo* absorption of glucose by chenodeoxycholylcholamine (0.16 mg/ml) in four experiments was only 10% under conditions that produced approximately 50% inhibition of taurodehydrocholate uptake. The results were consistent with previous structure-activity studies of the active ileal bile salt transport system.

0802 STUDY OF MATURATION OF THE HEPATIC TRANSPORT MECHANISMS FOR ANIONIC DYES USING INDOCYANINE GREEN KINETICS. (Ger.) Heimann, G.; Roth, B. (No affiliation given). *Klin. Wochenschr.* 53(19):935; 1975.

0803 ^{51}Cr-EDTA, ^{91}Y AND ^{141}Ce AS NONABSORBED REFERENCE SUBSTANCES IN THE GASTROINTESTINAL TRACT OF THE CHICKEN. (Eng.) Sklan, D.; Dubrov, D.; Eisner, U.; Hurwitz, S. (Dept. Animal Science, Hebrew Univ., Rehovot, Israel). *J. Nutr.* 105(12):1549-1552; 1975.

0804 METHODS USED TO ESTIMATE THE UNIDIRECTIONAL FLUXES OF SODIUM SIMULTANEOUSLY ACROSS THE MUCOSAL AND SEROSAL BORDERS OF RABBIT ILEUM. (Eng.) Naftalin, R. J.; Neale, H.; Simmons, N. L. (Dept. Physiology, Univ. Leicester LE1 7RH, England). *J. Physiol.* 252(2):7P-8P; 1975.

0805 THE INVOLVEMENT OF PROTEIN SYNTHESIS IN THE ACTIONS OF ANGIOTENSIN ON FLUID TRANSPORT BY RAT JEJUNUM IN VIVO. (Eng.) Bolton, J. E.; Munday, K. A.; Parsons, B. J. (Dept. Physiology and Biochemistry, The Univ., Southampton SO9 3TU, England). *J. Physiol.* 252(2):78P-79P; 1975.

0806 GASTROINTESTINAL ABSORPTION OF ANISOLE, trans-ANETHOLE, BUTYLHYDROXYANISOLE AND SAFROLE IN THE RAT. (Fre.) Fritsch, P.; de Saint Blanquat, G.; Derache, R. (INSERM, U. 87, Universite Paul Sabatier, Institue de Physiologie, 2 Rue Francois Magendie, 31400 Toulouse, France). *Food Cosmet. Toxicol.* 13(3):359-363; 1975.

0807 THE COMPARTMENTALIZATION OF Na WITHIN RABBIT ILEUM: THE EFFECTS OF D-GALACTOSE. (Eng.) Naftalin, R. J.; Simmons, N. L. (Dept. Physiology, Univ. Leicester LE1 7RH, England). *J. Physiol.* 252(2):87P-88P; 1975.

0808 OCCURRENCE AND PROPERTIES OF FETAL INTESTINAL GLYCOSIDASES (DISACCHARIDASES) IN HUMAN AMNIOTIC FLUID. (Eng.) Potier, M.; Dallaire, L.; Melancon, S. B. (Hopital Sainte-Justine, 3175, chemin Sainte-Catherine, Montreal H3T 1C5, Quebec, Canada). *Biol. Neonate* 27(3/4): 141-152; 1975.

0809 FOOD IRON ABSORPTION: I. USE OF A SEMI-SYNTHETIC DIET TO STUDY ABSORPTION OF NONHEME IRON. (Eng.) Cook, J. D.; Monsen, E. R. (Kansas Univ. Medical Center, Kansas City, KS). *Am. J. Clin. Nutr.* 28(11):1289-1295; 1975.

0810 INHIBITION OF BILE ACID AND WATER ABSORPTION BY PHENETHYLBIGUANIDE IN RAT ILEUM IN VIVO. (Eng.) Caspary, W. F.; Lucke, H. (Dept. Medicine, Univ. Gottingen, Gottingen). *Digestion* 12(3):179-182; 1975.

0811 ABSORPTION OF ENTERIC AND NON-ENTERIC COATED PREDNISOLONE TABLETS. (Eng.) Hulme, B.; James, V. H. T.; Rault, R. (St. Mary's Hosp., London, W.2., England). *Br. J. Clin. Pharmacol.* 2(4):317-320; 1975.

0812 EFFECT OF MATERNAL PROTEIN DEPRIVATION ON IN VITRO NEONATAL INTESTINAL FUNCTION IN RATS. (Eng.) Fitzgerald, J. F.; Ferdinandus, L. D. (James Whitcomb Riley Hosp. Children, Indianapolis, IN 46202). *J. Nutr.* 105(11):1476-1480; 1975.

See also, 0841, 0957, 1108, 1176.

0813 INTESTINAL PROPULSION IN THE DOG: ITS RELATION TO FOOD INTAKE AND THE MIGRATORY MYOELECTRIC COMPLEX. (Eng.) Summers, R. W.; Helm, J.; Christensen, J. (Univ. Hosp., Iowa City, IA 52242). *Gastroenterology* 70(5):753-758; 1976.

Electrical events and flow were studied *in vivo* in the small intestine of six dogs. The transit of a small radioactive bolus injected into the jejunum was monitored by counting from a Biebl loop. After feeding (2-10 hr), the bolus propulsion rate varied within a narrow range. When food and water were withheld over 12 hr, transit of the bolus became highly variable. The variability increased at about the same time as the onset of the migratory myoelectric complex associated with fasting. Electrical recordings from the intestinal muscle demonstrated bolus propulsion into the loop before the band of intense spike potentials, which traveled along the small intestine in the fasted state. The bolus was cleared from the loop when the spike potentials reached this segment. Variability of transit after prolonged fasting can be explained by variability in the rate of migration of the phase of intense spike potentials, and by the timing of the injection of the bolus in relation to the component phases of the electrical complex. Flow is highly dependent upon the electrical activity and the resulting contraction patterns of the small intestine, which are themselves dependent upon feeding.

0814 SOME DIFFERENCES IN CONTRACTILE RESPONSES OF ISOLATED LONGITUDINAL AND CIRCULAR MUSCLE FROM THE GUINEA-PIG STOMACH. (Eng.) Kuriyama, H.; Mishima, K.; Suzuki, H. (Dept. Physiology, Kyushu Univ., Fukuoka 812, Japan). *J. Physiol.* 251(2):317-331; 1975.

The mechanical and electrical properties of the longitudinal (fundus and corpus) and circular (antrum) muscle fibers of the guinea pig stomach were investigated. In the longitudinal but not in the circular muscle, isotonic K Krebs (sodium replaced by potassium) and Na-free (sucrose) Krebs solutions produced a contracture with a tonic component. The different mechanical responses were not accompanied by different membrane responses. Verapamil abolished both phasic and tonic components of K-induced contracture. During the tonic response of the K-induced contracture, repolarization of the membrane by current pulses relaxed the tissue; after cessation of the current pulse, rebound contracture occurred. In the circular muscle, the Q_{10} value for the rate of relaxation induced by inward current pulse was 3.1 and for the development of rebound contracture was 2.4. After immersion in Ca-free isotonic K Krebs solution, application of Ca produced a large contracture in the longitudinal muscle, but contracture in the circular muscle was small or absent. However, the amplitude of subsequent carbachol-induced contracture in the above solution was enlarged in proportion to the durations of Ca treatment in both tissues. Direct tetanic electrical stimulation produced tension in both tissues. With low frequency of stimulation (0.1 Hz), a positive staircase was observed in the circular but not in the longitudinal muscle. It is concluded that topical differences of the motility in the stomach may be due not only to the activity of nervous elements, but also to differences in the properties of the muscle fibers themselves.

0815 MEASUREMENT OF THE MEAN TRANSIT TIME OF DIETARY RESIDUE THROUGH THE HUMAN GUT. (Eng.) Cummings, J. H.; Jenkins, D. J. A.; Wiggins, H. S. (Dunn Nutrition Lab., Milton Rd., Cambridge, U.K.). *Gut* 17(3):210-218; 1976.

The mean transit time (MTT) of digesta through the human gut was measured using a single dose technique. In addition, a constant amount of marker (radio-opaque pellets) was given to six subjects on normal unrestricted diets and five subjects on controlled diets over a 4- or 6-week period, resp., and the number of markers recovered in the stools was measured. The MTT measured by this method (MTT-C) was compared with MTT measured by giving single doses of similar markers to the same subjects (MTT-S) and with the 80% transit time (80% TT). Mean values on three dietary regimes for the MTT-C (54.2 hr) and MTT-S (54.2 hr) were lower than that for 80% TT (63.1 hr). The average MTT-C in a group of six healthy young men on unrestricted diets was 2.3 days (range 0.7-4.0). When additional dietary fiber was added to a standard diet, the average MTT-C fell (in all of five subjects) from 2.4 to 1.6 days. The results of the single dose technique suggest that the MTT-S is a more accurate and reproducible method than the 80% TT, and that it correlated better with the MTT-C than does the 80% TT. However, a continuous record of MTT-C demonstrated wide variations in transit time from week to week by this method, even on controlled diets.

0816 TRANSIT THROUGH THE GUT MEASURED BY ANALYSIS OF A SINGLE STOOL. (Eng.) Cummings, J. H.; Wiggins, H. S. (Dunn Nutrition Lab., Milton Rd., Cambridge, U.K.). *Gut* 17(3): 219-223; 1976.

A single-time stool collection and analysis method for measuring transit time through the gut is described. The subject is given 20 radio-opaque markers on each of 3 consecutive days with breakfast using a different but comparable marker on each day. The first stool passed after rising on the fourth day is collected and its marker content analyzed. The method was validated in 15 healthy male subjects by comparing it on 36 occasions with mean transit time measured by a continuous marker technique (MTT-C). In 35 of these studies, transit measured from a single stool (SST) and MTT-C were significantly correlated ($p<0.001$). In one study, the designated stool contained none of the SST markers. An alternative way of validating the SST method is described by comparing it with the average of the three mean transit times from three separate doses of marker (MTT-S). The average MTT-S agreed very closely with MTT-C in 36 studies ($p<0.001$) and proved a satisfactory alternative

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method for validating transit techniques. In a total of 66 studies in 22 subjects the average MTT-S correlated significantly with SST ($p<0.001$). The SST method of measuring transit is accurate over 1-4 days and should be useful for epidemiological studies and as a hospital outpatient procedure.

0817 STOCHASTIC MODEL OF CONTRACTIONS AT A POINT IN THE DUODENUM.

(Eng.) Singerman, R. B. J.; Macagno, E. O.; Glover, J. R.; Christensen, J. (Dept. Internal Medicine, Iowa Inst. Hydraulic Res., Iowa City, IA 52242). *Am. J. Physiol.* 229(3):613-617; 1975.

Contractions at one point in the human duodenum were studied as a time series. Manometric records were made over long time periods from the duodenum in fed human subjects. A 5-sec grid was superimposed on the time axis of the records. Each 5-sec interval was treated as a slow-wave cycle within which either a contraction or a no-contraction could occur. Trends occurred in the resulting series of alternating runs of contractions and no-contractions, indicating possible temporal dependence. A Markov-type model that assumed a probability of contraction dependent on the three previous slow wave cycles was used to try to generate data similar to the real data. The frequency distributions obtained from the real and generated data were compared using Chi-square goodness-of-fit tests and found to be statistically similar. The correlations in time found for the contractions might be due to a time dependency in the controls for contraction over four successive slow-wave periods, 20 sec in humans.

0818 INTRALUMINAL PRESSURES DURING PERFUSION OF THE HUMAN COLON IN SITU.

(Eng.) Chauve, A.; Devroede, G.; Bastin, E. (Centre Hospitalier Universitaire, Sherbrooke, Quebec, Canada). *Gastroenterology* 70(3):336-340; 1976.

Transintestinal intubation was used to investigate and analyze pressure recordings in the right, transverse, and left colon in nine healthy men. Isotonic saline was infused into the cecum at various flow rates from 10-30 ml/min. During colonic perfusions, pressure waves were simple and distorted only by respiratory artifacts. Their amplitude was large (10-44 cm H_2O), of long duration (8-68 sec), and of low frequency (0.2-1.8 wave/min). Wave frequency was very stable, with stability uninfluenced by the site of recording and the rate of perfusion. A pressure wave in the right colon was always followed within 3 sec by a wave in the transverse and left colon. The frequency and amplitude of the waves increased in all subjects and at all rates of perfusion from right to left colon ($p<0.001$). The wave frequency increased with the perfusion flow rate ($p<0.001$). The relationship between the perfusion flow rate and the wave amplitude was curvilinear ($p<0.01$). It is concluded that in the human colon perfused *in situ*, there is a gradient of motility preventing aboral propulsion. This study suggests that during perfusion, liquids are trapped in the right colon. Water and electrolyte transport data obtained from whole colon perfusion may reflect events occurring in the proximal part of the large bowel.

0819 MANOMETRIC STUDIES OF THE HUMAN PYLORUS.

(Eng.) Kaye, M. D.; Mehta, S. J.; Showalter, J. P. (Univ. Vermont Coll. Medicine, C-321, Given Medical Building, Burlington, VT 05401). *Gastroenterology* 70(4):477-480; 1976.

The gastroduodenal junction was studied manometrically by means of simultaneous measurements of pressure and potential difference between skin and mucosa to determine whether this region is a zone of tonically elevated pressure. An accurate and circumferentially sensitive miniature transducer assembly failed to reveal a zone of elevated pressure at the pyloric sphincter of any of eight fasting normal subjects. Additional studies were performed in 10 other subjects using a six-lumen perfused catheter system in which three of the pressure-transmitting catheters had circu ferentially arranged openings at the same axial level. Measurements of pressure and potential difference were obtained basally during intraduodenal infusion of 0.1 N of hydrochloric acid and after intraduodenal instillation of 30 ml of olive oil. Tonic elevation in pressure was recorded simultaneously by all three leads at the gastroduodenal junction in only one subject. Thus, the normal human pylorus was not demonstrated to be a high pressure zone.

0820 LARGE BOWEL MYOELECTRICAL ACTIVITY IN MAN.

(Eng.) Taylor, I.; Duthie, H. L.; Smallwood, R.; Linkens, D. (Dept. Surgery, Univ. Sheffield Sheffield, England). *Gut* 16(10):808-814; 1975.

The myoelectrical activity of the colon and rectum was studied in 108 subjects (with no known pathology in this area), using three types of electrodes--intra luminal, serosal, and cutaneous. Two frequency bands of slow waves were found around the colon. The lower frequency band displayed a similar frequency at all levels of the large bowel when present with no apparent gradient of activity. The higher frequency band varied along the bowel, and was observed more often than the slower. There was little change in frequenc from the right colon along the transverse, but a defi ite gradient existed from the sigmoid down into the rectum. Regular sequences of pressure waves in all regions occurred, corresponding to the slow wave frequency. The observed gradient in slow wave frequency may be related to differences in transit on different sides of the colon.

0821 RELATIONSHIP OF SERUM GASTRIN RESPONSE TO LOWER OESOPHAGEAL SPHINCTER PRESSURE.

(Eng.) Dent, J.; Hansky, J. (Prince Henry's Hosp., Melbourne, Victoria, Australia). *Gut* 17(2):144-146; 1976.

The role of gastrin in controlling lower esophageal sphincter pressure (LESP) was examined by measurement of LESP and serum gastrin response to a test protein solution and a control isosmotic saline solution in 19 healthy volunteers. LESP was measured by constant perfusion manometry in 14 men and 5 women (mean age, 21 yr). Both solutions were associated with significant ($p < 0.005$) rise in LESP, but serum gastrin rose significantly ($p = 0.05$) only after the protein solution. The rise in serum gastrin after the protein solution preceded the rise in LESP by 30 min. These results suggest that the lower esophageal sphincter response to feeding may be independent of protein and is unrelated to gastrin release.

0822 POST PRANDIAL CHANGES IN COLONIC MOTILITY RELATED TO SERUM GASTRIN LEVELS. (Eng.)

Kirwan, W. O.; Smith, A. N. (Western General Hosp., Edinburgh, Scotland). *Scand. J. Gastroenterol.* 11 (2):145-149; 1976.

The correlation of colonic motility response to food and post prandial rise in serum gastrin was examined in 16 subjects. Sigmoid colonic motility was recorded during a basal half hour and for 90 min following the ingestion of a protein meal. Both serum gastrin response and colonic motor activity curves were biphasic. The serum gastrin response occurred 5 min after the motility response began, and it climbed steeply and linearly to 80% above basal at 20 min. This elevation was maintained for 35 min and then fell to 65% at 50 min; a secondary rise, to 92%, was reached at 90 min. Motility was already 30% above basal by the beginning of the gastrin response. The motility index rose in the next 5 min until it was 85% above basal. It then fell gradually to its lowest point (15% above basal at 50 min), but later climbed to 60% above basal at 90 min. The frequency response showed the earliest change, and it may be neurogenic since it preceded the gastrin rise. This response was later "extinguished" and was replaced by waves of increasing amplitude; the sustained nature of this response was closer to the gastrin response.

0823 INTERACTION OF GASTRIN I, SECRETIN, AND CHOLECYSTOKININ ON GALLBLADDER SMOOTH MUSCLE.

(Eng.) Ryan, J.; Cohen, S. (Temple Univ. Sch. Medicine, Philadelphia, PA 19140). *Am. J. Physiol.* 230(3):553-556; 1976.

Experiments were undertaken to define the action of gastrin and secretin on isolated gallbladder smooth uscle strips and to determine whether gastrin or ecretin interacts with cholecystokinin (CCK) in regulating gallbladder motor function. Both CCK and he octapeptide of CCK (CCK-OP) stimulated gallbladder ontraction *in vitro*, with CCK-OP (25 ng/ml) being ore potent. Gastrin I, (1.0-100 ng/ml) had no effect n gallbladder contractility. Secretin (3.0-00 ng/ml) alone also showed no effect on gallbladder mooth muscle, but at 150 ng/ml in combination with CK-OP, it produced a noncompetitive type of inhibiion. Michaelis-Menten kinetics showed the calculated aximum response of the secretin plus CCK-OP interacion to be less than with CCK-OP alone. There was no hange in the dose required to achieve half-maximal esponse. These studies indicate that: CCK-OP as a greater effect on gallbladder contractility than CCK; gastrin I has no effect on gallbladder muscle tone; and secretin acts as a noncompetitive antagonist of CCK-OP. These findings suggest that gallbladder motor function may be determined, in part, by the interaction of secretin and CCK rather than solely in response to CCK.

0824 EFFECT OF DOPAMINE ON THE ESOPHAGEAL SMOOTH MUSCLE IN VIVO. (Eng.)

Rattan, S.; Goyal, R. K. (Southwestern Medical Sch., 5323 Harry Hines Blvd., Dallas, TX 75235). *Gastroenterology* 70(3): 377-381; 1976.

Experiments were conducted to determine the site of action of dopamine, the nature of the receptors that mediate the effect of dopamine, and the effect of dopamine antagonism on the esophageal response to vagal stimulation in the opossum. The i.v. administration of dopamine to 21 animals caused a dose-dependent reduction in the lower esophageal sphincter pressure and contractions in the lowermost part of the body of the esophagus. A dose of 5 µg/kg produced maximal response. The onset of contractions in the body occurred around 20 sec after the onset of the sphincter response. The effect of dopamine was different from isoproterenol (2.5 µg/kg), which caused no contractions in the body and caused reduction in sphincter pressure, and from phenylephrine (50 µg/kg), which also caused no contractions in the body but caused contraction of the sphincter. Moreover, the effect of 5 µg/kg of dopamine was blocked by haloperidol (3 mg/kg) but not by phentolamine (1 mg/kg), propranolol (1 mg/kg), bilateral cervical vagotomy, or tetrodotoxin (10-20 µg). These studies suggest the presence of selective dopamine receptors that mediate contraction of the esophageal body and relaxation of the sphincter muscle. Since vagal stimulation also causes contraction in the body and relaxation of the sphincter, it is possible that vagal effect on the esophagus is mediated by dopamine receptors. However, haloperidol did not block the effect of electrical stimulation of vagus nerve on body of the esophagus or the lower esophageal sphincter.

0825 GASTRODUODENAL MOTOR RESPONSE TO NATURAL MOTILIN AND SYNTHETIC POSITION 13-SUBSTITUTED MOTILIN ANALOGUES: A COMPARATIVE IN VITRO STUDY. (Eng.)

Strunz, U.; Domschke, W.; Domschke, S.; Mitznegg, P.; Wunsch, E.; Jaeger, E.; Demling, L. (Dept. Medicine and Pharmacology, Univ. Erlangen-Nurnberg, Erlangen, W. Germany). *Scand. J. Gastroenterol.* 11(2):199-203; 1976.

Motor effects of graded concentrations of pure natural porcine motilin (13-Met-M) and synthetic motilin analogues, the methionine in position 13 substituted with either norleucine (13-Nle-M) or leucine (13-Leu-M), on the rabbit, guinea-pig, rat, and human gastrointestinal smooth muscle were examined *in vitro*. Congruent species specificity of the motor activity of the motilins studied was demonstrated; muscle strips from rabbit and man were highly sensitive, whereas guinea-pig and rat preparations were refractory to the polypeptides. In rabbit duodenal muscle and fundic muscle of the hu-

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man stomach, graded concentrations of 13-Met-M, 13-Nle-M, and 13-Leu-M, resp., produced graded increases in the contractile responses. The concentration-response curves were superimposable. Calculated maximal contractile responses (CMR's) and polypeptide doses for one-half maximal responses (D_{50} values) were not significantly different between the three motilins. Pharmacological analysis revealed that the motor effects of 13-Met-M, 13-Nle-M, and 13-Leu-M are not uniformly mediated via nervous pathways. Neither blockage of axonal conduction by tetrodotoxin nor anticholinergic action by atropine exerted any detectable influence. The data suggest that in man and rabbit natural porcine motilin and its synthetic position 13-substituted analogues, 13-Nle-M and 13-Leu-M, are of equal efficacy for gastroduodenal motor activity. In addition, it is concluded that position 13 of the amino acid sequence of motilin (22-residue chain) is not pertinent to the active site of the molecule.

0826 EFFECTS OF RICINOLEIC AND OLEIC ACIDS ON THE DIGESTIVE CONTRACTILE ACTIVITY OF THE CANINE SMALL AND LARGE BOWEL. (Eng.) Stewart, J. J.; Bass, P. (Center Health Sciences, Univ. Wisconsin, Madison, WI 53706). *Gastroenterology* 70(3): 371-376; 1976.

Oleic and ricinoleic acids or their *trans* isomers (elaidic and ricinelaidic acids) were administered intraduodenally in four dogs and evaluated for their effects on the digestive motor activity of the small and large bowel. The animals were implanted with duodenal cannulas and extraluminal strain gage transducers along the circular axis of the proximal and mid-jejunum, terminal ileum, and proximal colon. After feeding 200 g of canned dog food to induce contractile activity, 500 mg of the sodium salt of each fatty acid dissolved in 30 ml of isotonic saline was introduced into the duodenum as a single bolus infusion, and recordings were made for a 1-hr period. A 30-ml volume of saline served as control. Administration of each *cis* fatty acid produced an initial stimulation in jejunal areas of about a 2-min duration followed by a poststimulatory inhibition. Both the initial stimulation and poststimulatory inhibition were greater for ricinoleic acid than for oleic acid. Minimal or no effects were produced in ileal or colonic areas. In contrast, the *trans* isomers produced little or no effect on either the small or large bowel. Digestive contractile pattern alterations produced by p.o. administration of 10 ml of oleic, ricinoleic acid, or their respective triglycerides were also tested. Triolein had no effect. Ricinoleic acid and castor oil produced a brief initial stimulation followed by prolonged inhibition of small bowel motor activity. Digestive motor patterns returned to control approximately 45 min after oleic acid. There was no indication at any time of an initiation of continuous contractile activity after ricinoleic acid or castor oil that could justify the use of the terms "irritant" or "stimulant" to describe their actions.

0827 MANOMETRIC STUDIES ON THE HUMAN PYLORIC SPHINCTER: EFFECT OF CIGARETTE SMOKING, METOCLOPRAMIDE, AND ATROPINE. (Eng.) Valenzuela, J. E.; Defilippi, C.; Csendes, A. (Univ. Chile, Sch. Medicine, Hospital J. J. Aguirre, Santiago, Chile). *Gastroenterology* 70(4):481-483; 1976.

The effects of cigarette smoking, atropine, and metoclopramide on pyloric sphincter pressure were examined in 7, 5, and 14 subjects, resp. Pyloric sphincter pressure was assessed with water-perfused polyvinyl tubes. Smoking one cigarette significantly decreased the basal pyloric pressure from 10.2 ± 1.2 to 7.9 ± 1.1 mm Hg. Ten milligrams of metoclopramide as an i.v. bolus increased the pyloric pressure in six normal subjects and in four patients with gastric ulcer with low basal pressure. Duodenal acidification with 0.1 N HCl significantly increased pyloric pressure. Atropine (15 μg/kg, s.c.) prevented the rise of pyloric pressure in response to acid infusion into the duodenum in all subjects. The results suggest that smoking-induced decrease in pyloric sphincter pressure may contribute to duodenogastric reflux (a possible etiologic factor of gastric ulcers), and that metoclopramide may be effective in gastric ulcer therapy by restoring pyloric pressure and decreasing duodenogastric reflux.

0828 GASTRIC EMPTYING AND SMALL INTESTINAL MUCOSAL INJURY IN RATS. (Eng.) Kent, T. H.; Cannon, B.; Reynolds, J.; Osborne, J. W. (Univ. Iowa Coll. Medicine, Iowa City, IA 52242). *Gastroenterology* 69(6):1246-1253; 1975.

The degree of small intestinal villus injury was related to the degree and mechanism of gastric retention in male Sprague-Dawley rats using an *in vivo* model for inducing injury by perfusion of mid-small intestine with various agents. Potentially injurious solutions 0.1, 0.05, and 0.025 N HCl and NaOH; 0.26 and 0.13 g/30 ml FeSO4; and 0.32, 0.16, 0.08, and 0.04 g/30 ml AgNO3 were infused at 0.5 ml/min for 1 hr. Two hours after perfusion, gastric emptying and small intestinal transit were measured by examining the gastrointestinal distribution of a nonabsorbable radioisotope (50μCi ^{51}Cr/0.5 ml) that had been placed in the stomach for 1 hr. There was a strong association between the degree of villus injury produced by various concentrations of the injurious agents and the degree of gastric retention. Necrosis of villus tips as produced by AgNO3 was sufficient to cause marked gastric retention. Injury to the small intestinal mucosa of one parabiotic rat did not produce gastric retention in the partner. It is concluded that injury to small intestinal villi is sufficient to induce gastric retention and that the effect is most likely nerve-mediated.

0829 MYOGENIC CONTROL OF INTESTINAL MOTILITY. (Eng.) Bortoff, A. (Upstate Medical Center, State Univ. New York, Syracuse, NY). *Physiol. Rev.* 56(2):418-434; 1976.

0830 ELECTRICAL AND MECHANICAL PROPERTIES OF THE LONGITUDINAL AND CIRCULAR MUSCLES OF THE GUINEA-PIG ILEUM. (Eng.) Suzuki, H.; Kuriyama, H. (Dept. Physiology, Kyushu Univ., Fukuoka 812, Japan). *Jpn. J. Physiol.* 25(6):759-773; 1975.

0831 EFFECT OF BODY POSITION ON GASTRIC EMPTYING IN THE NEONATE. (Eng.) Yu, V. Y. H. (Univ. Oxford, John Radcliffe Hosp., Headington, Oxford OX3 9DU England). *Arch. Dis. Child.* 50(7):500-504; 1975.

0832 EFFECTS OF THE DISTENSION OF THE THORACIC SEGMENT OF THE ESOPHAGUS ON THE SPONTANEOUS ACTIVITY OF THE DIAPHRAGM IN THE CAT AND IN RABBIT. (Fre.) Duron, B.; Jung-Caillol, M. -Cl.; Marlot, D. (Faculte de Medecine, 12, rue Frederic Petit, 80036 Amiens Cedex, France). *C. R. Acad. Sci.* [*D*] *(Paris)* 281(23):1863-1866; 1975.

0833 ACTION OF SIX COMMONLY USED BENZODIAZEPINES ON ISOLATED GUINEA-PIG ILEUM PREPARATION. (Eng.) Huck, S.; Stacher, G.; Gogolak, G.; Stumpf, Ch. (Psychophysiology Unit, Univ. Vienna, Vienna, Austria). *Arch. Int. Pharmacodyn.* 218(1):77-83; 1976.

0834 CANINE CHOLECYSTOKINESIS: EFFECT OF OCTAPEPTIDE OF CHOLECYSTOKININ. (Eng.) Amberg, J. R. (Vanderbilt Univ. Sch. Medicine, Nashville, TN). *Radiology* 110(1):223-224; 1975.

0835 EFFECT OF RELEASE OF ENDOGENOUS GASTRIN ON MYOELECTRICAL AND MECHANICAL ACTIVITY OF ISOLATED CANINE STOMACH. (Eng.) Kowalewski, K.; Zajac, S.; Kolodej, A. (Dept. Surgery, Univ. Alberta, Edmonton T6G 2H7, Canada). *Pharmacology* 13(1):56-64; 1975.

0836 EFFECTS OF INSULIN ON THE ELECTRICAL ACTIVITY OF THE JEJUNUM IN SHEEP. (Fre.) Bueno, L.; Ruckebusch, Y. (Laboratoire de Physiologie-Pharmacodynamie, Ecole Nationale Veterinaire, 31076 Toulouse Cedex, France). *C. R. Soc. Biol.* 169(2):430-434; 1975.

0837 INTESTINAL SMOOTH MUSCLE CONTRACTION AND THE EFFECTS OF CADMIUM AND [IONOPHORE] A23187. (Eng.) Triggle, C. R.; Grant, W. F.; Triggle, D. J. (Faculty Medicine, Memorial Univ., St. John's, Newfoundland, Canada AIC 557). *J. Pharmacol. Exp. Ther.* 194(1):182-190; 1975.

0838 FURTHER STUDIES ON THE GANGLIONIC AND NEUROMUSCULAR BLOCKING ACTION OF MAGNESIUM IN THE GUINEA-PIG ISOLATED ILEUM. (Eng.) Beleslin, D. B.; Samardzic, R. (Dept. Pharmacology, Medical Faculty, Beograd 11.105, Yugoslavia). *Neuropharmacology* 14(5/6):337-344; 1975.

See also, 0956, 0961, 0988, 1022, 1023.

SECRETION AND METABOLISM

0839 CIRCADIAN VARIATIONS IN THE DURATION OF MITOSIS IN THE EPITHELIUM OF MOUSE ESOPHAGUS. (Rus.) Liosner, L. D.; Markelova, I. V. (Inst. Human Morphology, USSR Acad. Medical Sciences, Moscow, USSR). *Biull. Eksp. Biol. Med.* 79(6):89-92; 1975.

0840 COMPARISON OF THE SECRETORY PROCESSES IN THE PAROTID AND SUBLINGUAL GLANDS OF THE MOUSE: I. REGULATION OF THE SECRETORY PROCESSES. (Eng.) Vreugdenhil, A. P.; Roukema, P. A. (Dept. Oral Biochemistry, Vrije Univ., Van der Boechorststraat 7, Box 7161, Amsterdam, Netherlands). *Biochim. Biophys. Acta.* 413(1):79-94; 1975.

0841 IMPORTANCE OF GENETIC FACTORS INFLUENCING THE METABOLISM OF FOREIGN COMPOUNDS. (Eng.) Nebert, D. W.; Felton, J. S. (Natl. Inst. Child Health and Human Development, Bethesda, MD 20014). *Fed. Proc.* 35(5):1133-1141; 1976.

0842 INTRACELLULAR LOCALIZATION AND SIZE OF GLYCOGEN PARTICLES IN GLYCOGEN SYNTHESIZED UNDER HISTOCHEMICAL CONDITIONS. (Eng.) Takeuchi, T.; Sasaki, M.; Miyayama, H.; Ohyumi, M.; Miyajima, H. (Kumamoto Univ. Sch. Medicine, Kumamoto, Japan). *J. Histochem. Cytochem.* 23(12): 945-956; 1975.

0843 DIVERSION OF ETHANOL METABOLISM BY SULFHYDRYL AMINO ACIDS. D-PENICILLAMINE-DIRECTED EXCRETION OF 2,5,5-TRIMETHYL-D-THIAZOLIDINE-4-CARBOXYLIC ACID IN THE URINE OF RATS AFTER ETHANOL ADMINISTRATION. (Eng.) Nagasawa, H. T.; Goon, D. J. W.; Constantino, N. N.; Alexander, C. S. (Veterans Admin. Hosp., Minneapolis, MN 55417). *Life Sci.* 17(5):707-713; 1975.

0844 EFFECTS OF GALLIC ACID ON NITROSAMINE FORMATION. (Eng.) Walker, E. A.; Pignatelli, B.; Castegnaro, M. (International

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Agency Res. on Cancer, 150 Cours Albert-Thomas, 69008 Lyon, France). *Nature* 258(5531):176; 1975.

0845 THE EFFECT OF RADIOPROTECTIVE AGENTS ON THE LEVEL OF CYCLIC ADENOSINE-3',5'-MONOPHOSPHATE (cAMP) AND THE ACTIVITIES OF ADENYLATE CYCLASE AND cAMP PHOSPHODIESTERASE. (Rus.) Sobolev, A. S.; Orekhov, A. N.; Chirkov, Iu.; Kudriashov, Iu, B. (M. V. Lomonosov State Univ., Moscow, USSR). *Dokl. Adad. Nauk SSSR* 224(3):713-716; 1975.

0846 THE ROLE OF MORPHOFUNCTIONAL STATE OF THE GASTROINTESTINAL TRACT IN THE GENESIS OF EARLY STAGES OF ATHEROSCLEROSIS. (Rus.) Klimenko, E. D.; Lebedeva, R. P. (USSR Acad. Medical Sciences, Moscow, USSR). *Biull. Eksp. Biol. Med.* 79(6):114-117; 1975.

See also, 1104.

SECRETION AND METABOLISM

Stomach

0847 IDENTIFICATION OF GLUCAGON-PRODUCING CELLS (A CELLS) IN DOG GASTRIC MUCOSA. (Eng.) Baetens, D.; Rufener, C.; Srikant, B. C.; Dobbs, R.; Unger, R.; Orci, L. (Univ. Geneva Medical Sch., Geneva, Switzerland). *J. Cell Biol.* 69(2):455-464; 1976.

Immunocytochemical studies using a specific antiglucagon serum were undertaken in gastrointestinal mucosa from 12 dogs to determine whether gastric cells resembling pancreatic A cells are the source of gastric glucagon. Glucagon-containing cells situated exclusively in the oxyntic glandular gastric mucosa were found. Electron microscope examination of the mucosa demonstrated endocrine cells containing secretory granules with a round dense core surrounded by a clear halo, indistinguishable from secretory granules of pancreatic A cells. Like the alpha granules of pancreatic A cells, the granules of these gastric endocrine cells exhibited a peripheral distribution of silver grains after Grimelius silver staining. Moreover, the granules of these cells were found to be specifically labeled with reaction product, using the peroxidase immunocytochemical technique at the ultrastructural level. Accordingly, these cells were named gastric A cells. These data suggest that the gastric oxyntic mucosa contains cells that are cytologically, cytochemically, and immunocytochemically indistinguishable from pancreatic A cells. It is believed that gastric A cells are responsible for the secretion of the gastric glucagon.

0848 THE ROLE OF THE ANTRUM IN DETERMINING THE ACID SECRETORY RESPONSE TO MEALS OF DIFFERENT CONSISTENCY. (Eng.) Hunt, D. R.; Forrest, A. P. M. (St. George Hosp., Kogarah, 2217 NSW, Australia). *Gut* 16(10):774-776; 1975.

The secretory response to meat in homogenized and minced forms was assessed in three dogs with denervated Heidenhain pouches, before and after antral denervation. The acid output from the pouch was measured every 15 min for 4 hr after feeding. The acid output after feeding with homogenized meat exceeded that for minced meat to a significant degree in each dog. Antral denervation reduced the acid response to both meals in two of the dogs, but for all three, the reduction in the mean was significant. Titration showed that when particle size is reduced, the buffering capacity is increased. The results indicate the need for reviewing the effects of food preparation on acid secretion in man.

0849 CHOLINERGIC RELEASE OF GASTRIN BY FEEDING IN CATS. (Eng.) Svensson, S.-O.; Emas, S.; Dorner, M.; Kaess, H. (Karolinska Hosp., Stockholm, Sweden). *Gastroenterology* 70(5):742-746; 1976.

The effect of atropine on acid secretion and serum gastrin level after feeding was studied in eight cats with denervated fundic pouches (Heidenhain pouch, HP). Serum gastrin concentration was measured by radioimmunoassay. In the control experiments, the mean peak acid response occurred 45 min after feeding and the mean peak gastrin concentration 15 min after feeding. After the first postprandial hour, acid secretion declined but the gastrin level remained elevated. Atropine (0.1 mg/kg, i.v.), 5 min before feeding, depressed both acid secretion and the increase in serum gastrin concentration during the first postprandial hour. In both the control and atropine experiments, acid secretion and serum gastrin level were correlated significantly during the first postprandial hour, but no correlation was found later in the experiments. The reduction by atropine of the acid and serum gastrin responses varied among the cats but was correlated significantly. A cholinergic mechanism is implicated in the release of gastrin by feeding in cats during the first postprandial hour. Atropine partly reduces the HP acid response to feeding by depressing the release of gastrin.

0850 VARIATION IN SERUM GASTRIN CONCENTRATION AND HEIDENHAIN POUCH ACID SECRETION DURING FEEDING IN DOGS. (Eng.) Brandsborg, O.; Bone, J.; Brandsborg, M.; Amdrup, E. (Kommunehospitalet, Aarhus Univ., Aarhus, Denmark). *Chir. Gastroenterol.* 9(1):29-36; 1975.

A comparison is made between variations in immunoreactive serum gastrin and Heidenhain pouch secretion during food stimulation in six mongrel dogs. The dogs were prepared with a vagally denervated pouch (HP) and, after 4 weeks of stabilization, were fasted for 18 hr before each experiment. The dogs were given 200 g of standard dog food and blood was taken from a permanent needle inserted into a peripheral vein 30 min before to 5 hr after the meal. Gastrin was measured by radioimmunoassay and the HP secretion collected every 30 min for 5 hr after the test meal. Maximum gastrin concentration occurred 5-15 min after feeding and then fell rapidly, reaching basal levels 3 hr later. No significant acid secretion appeared in 30 min after feeding. Then pouch secretion increased, with maximum levels reached 60-90 min after feeding. Basal levels occurred 5 hr after feeding. A considerable delay between maximum serum gastrin concentration and Heidenhain pouch acid secretion was demonstrated, suggesting that Heidenhain pouch function may be caused by several humoral influences on the parietal cells.

0851 EFFECT OF HYPOPHYSECTOMY AND GROWTH HORMONE ON SERUM AND ANTRAL GASTRIN LEVELS IN THE RAT.

(Eng.) Enochs, M. R.; Johnson, L. R. (Univ. Texas Medical Sch., P.O. Box 20708, 6400 W. Cullen St., Houston, TX 77025). *Gastroenterology* 70(5): 727-732; 1976.

The effects of hypophysectomy and subsequent replacement therapy with growth hormone on serum and antral gastrin levels were investigated in both fasted and nonfasted pair-fed Sprague-Dawley rats. Hypophysectomy caused a 57% decrease in serum and 47% decrease in antral gastrin content in 18-hr fasted animals. In nonfasted animals, hypophysectomy resulted in a 42% fall in serum gastrin and a 76% fall in antral gastrin. Animals were given injections of growth hormone over a 10-day period, then fasted 16-18 hr before being killed. Doses of 100-200 μg/100 g of body weight were ineffective, but a dose of 500 μg/100 g completely restored serum gastrin levels to intact control values. In nonfasted rats this same dose raised serum gastrin to intact levels and increased antral gastrin significantly over hypophysectomized levels but did not increase it to contol values. When given to pair-fed intact animals, growth hormone caused slight but not significant elevations in serum and antral gastrin. The effect of growth hormone on gastrin secretion and/or synthesis may be a significant physiologic factor in the regulation of normal gastrointestinal function and growth.

0852 JEJUNAL INHIBITION OF PENTAGASTRIN-INDUCED GASTRIC ACID SECRETION IN MAN AND HEIDENHAIN POUCH DOGS.

(Eng.) Christiansen, J.; Holst, J. J.; Rokkjaer, M. (Malmtoften 3, DK-2830 Virum, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(2):219-224; 1976.

The effect of intrajejunal administration of hypertonic glucose and saline and of fat on pentagastrin-induced gastric acid secretion in nine healthy human subjects (five men and four women, aged 20-28 yr) and three mongrel dogs is reported. In human studies, an overnight fast was followed by the infusion of a marker substance (^{51}Cr-EDTA, flow 30 ml/hr) to assay recovery. Four of the subjects were controls and infused intrajejunally with physiologic saline. Five other subjects were studied three times on different days. Pentagastrin, 0.5 μg/kg/hr, was administered for 3 hr as a continuous i.v. infusion. When a secretory plateau was attained, 100 ml of 50% glucose, 100 ml of 9.3% saline, or 100 ml of fat emulgation was infused over a 5-min period. In the control group, 100 ml of physiologic saline was infused. In the dog studies, a denervated fundic pouch provided with an abdominal cannula was prepared. Pentagastrin was administered i.v., 1 μg/kg/hr, for 30 min. Following this, 50 ml of 50% glucose solution or 9.3% saline was infused through the cannula for 5 min, and stomach secretions were collected. In the human control study, the physiologic saline did not affect gastric acid secretion. In contrast, the other three solutions (hypertonic saline and glucose and fat) produced a significant decrease in acid output, volume secretion, and acidity. The magnitude was the same irrespective of intrajejunal infusion. In the dog studies, glucose infusion produced an equal inhibition of pentagastrin-induced secretion from the pouch and main stomach, while the 9.3% saline produced little or no effect. The results demonstrate the existence of potent jejunal inhibitors of gastric secretion that may operate independently of vagal innervation.

0853 COMPARISON OF METHYLATED PROSTAGLANDIN E_2 ANALOGUES GIVEN ORALLY IN THE INHIBITION OF GASTRIC RESPONSES TO PENTAGASTRIN AND PEPTONE MEAL IN MAN.

(Eng.) Konturek, S. J.; Kwiecien, N.; Swierczek, J.; Oleksy, J.; Sito, E.; Robert, A. (Inst. Physiology, Grzegorzecka 16, 31-531 Krakow, Poland). *Gastroenterology* 70(5):683-687; 1976.

The effects on gastric secretion of three methyl analogues of prostaglandin (PG)E_2, 15(R)-15-methyl PGE_2 methyl ester, 15(S)-15-methyl PGE_2 methyl ester, and 16,16-dimethyl PGE_2 were studied in random, double blind tests in 32 healthy men. Secretion was measured for 30 min, and a PG analogue (1.25-2.5 μg/kg) or a placebo was administered. Gastric secretion was then stimulated either by an i.v. infusion of pentagastrin (2 μg/kg-hr) or by a peptone meal with acid secretion determined by intragastric titration technique. The methyl PG analogues tested exhibited a profound and prolonged inhibitory action on gastric acid and pepsin secretion induced by pentagastrin. PG analogues caused almost complete inhibition of gastric acid response to a peptone meal with a significant reduction in the serum concentration of immunoassayable gastrin. Except with the highest dose of PG(S)-15-methyl-PGE_2 methyl ester, which caused abdominal discomfort and single episodes of diarrhea in some subjects, no symptoms or untoward biochemical effects were observed. The methylated PG analogues studied are very potent inhibitors of gastric acid and pepsin secretion stimulated by pentagastrin or a meal and may have clinical potential in the treatment of peptic ulcer.

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0854 STIMULATION OF GASTRIC ACID SECRETION IN THE DOG BY THE C-TERMINAL PENTA-, TETRA-, AND TRIPEPTIDES OF GASTRIN AND THEIR O-METHYL ESTERS. (Eng.) Lin, T. M.; Southard, G. L.; Spray, G. F. (Lilly Res. Lab., Indianapolis, IN 46206). *Gastroenterology* 70(5):733-736; 1976.

The relative potency of the C-terminal peptides of gastrin, of the *O*-methyl esters of the C-terminal tri- and tetrapeptides, and of the sulfone derivative of the C-terminal tetrapeptide amide on gastric HCl secretion was studied in six dogs. Acid secretion from the vagally innervated gastric fistula of unanesthetized dogs was stimulated in a dose-related manner by the C-terminal penta-, tetra-, and tripeptide amides of gastrin, the *O*-methyl esters of the tetra- and tripeptides, and the sulfone derivative of the tetrapeptide amide. The potency and efficacy of Peptavalon (a substituted pentapeptide) and the C-terminal penta- and tetrapeptide amides were about the same on a weight or molar basis. On a molar basis, the pentapeptide amide was about 4,300 times as potent as the tripeptide amide. The *O*-methyl ester and the sulfone derivative of the tetrapeptide were about equipotent, 1/25 and 1/30, resp., as potent as the tetrapeptide amide. The dipeptides amides did not stimulate acid secretion in a dose range of 50-1,500 μg/kg-hr. The results indicate that (a) the C-terminal tetrapeptide amide cannot be the minimal effective "stump" for biologic activity in the gastrin molecule, (b) the C-terminal amide is important but not essential for gastric stimulating power, and (c) oxidation of the sulfur atom of the methionyl residue in the tetrapeptide does not result in total loss of activity.

0855 INHIBITION OF GASTRIC ACID SECRETION IN MAN BY EXOGENOUS AND ENDOGENOUS PANCREATIC GLUCAGON. (Eng.) Christiansen, J.; Holst, J. J.; Kalaja, E. (Bispebjerg Hosp., Copenhagen, Denmark). *Gastroenterology* 70(5):688-692; 1976.

The interaction of i.v. infused glucagon and pentagastrin on gastric acid secrection was studied in five healthy subjects. In a step dose-response study with pentagastrin (0.01, 0.1, 1.0, and 10.0 μg/kg-hr), the dose required for one-half maximal response (D_{50}) was 130 ng/kg-hr. With this dose of pentagastrin as background stimulation in a step dose-response study with glucagon (0.5, 2.0, 8.0, and 16.0 μg/kg-hr), the dose of glucagon required for one-half maximal inhibition was 1.64 μg/kg-hr. In a third experiment, the dose-response study with pentagastrin was repeated on a background infusion of glucagon in the dose found to be D_{50}. A significant inhibition of acid secretion was found on all dose levels. The inhibition followed noncompetitive kinetics. Plasma concentrations of pancreatic glucagon in four of the five subjects were comparable to concentrations seen after a protein meal. Intravenous infusion of *l*-arginine on a background stimulation of acid secretion with synthetic human gastrin I (250 ng/kg-hr) was performed in seven healthy subjects. Arginine increased serum glucagon concentration to levels seen after a meal, and resulted in a significant inhibition of acid secretion. The results favor the hypothesis that pancreatic glucagon may participate in the physiologic inhibition of gastric acid secretion.

0856 EFFECT OF GROWTH HORMONE RELEASE-INHIBITING HORMONE ON GASTRIC SECRETION, MUCOSAL BLOOD FLOW, AND SERUM GASTRIN. (Eng.) Konturek, S. J.; Tasler, J.; Cieszkowski, M.; Coy, D. H.; Schally, A. V. (Inst. Physiology, 31-531 Krakow, ul. Grzegorzecka 16, Poland). *Gastroenterology* 70(5): 737-741; 1976.

The effect of growth hormone release-inhibiting hormone (GH-RIH) on gastric response to secretory stimulants and on gastric mucosal blood flow and serum gastrin level was studied in four mongrel dogs. GH-RIH, (2.5 μg/kg/hr, i.v.) infusion in the dogs with gastric fistulae and Heidenhain pouches (HP) almost completely inhibited acid and pepsin responses to pentagastrin, urecholine, and a peptone meal. Histamine-induced acid secretion was more resistant to the inhibition by GH-RIH, and only acid secretion evoked by the lower doses of histamine was suppressed by this peptide. The inhibition of pentagastrin-induced gastric secretion was associated with a marked reduction in mucosal blood flow. The ratio of aminopyrine concentration in the gastric juice and blood plasma was not significantly changed by GH-RIH, indicating that the reduction in mucosal blood flow was secondary to an inhibition of gastric secretion. Gastric acid and serum gastrin responses to a peptone meal adjusted to pH 5.0 and kept in the main stomach at this same pH by intragastric titration were significantly decreased by GH-RIH, suggesting that the observed acid inhibition may be attributed in part to suppression of gastrin release. GH-RIH inhibited acid secretion from HP stimulated by liver extract in HP. The finding that GH-RIH inhibits gastric secretion induced by exogenous stimulants as well as by the direct chemical stimulation of the HP mucosa without changing serum gastrin level suggests that the major action of GH-RIH is a direct suppression of the oxyntic glands.

0857 THE GASTRIC RESPONSE TO A TRANSPYLORIC DUODENAL TUBE. (Eng.) Longstreth, G. F.; Malagelada, J. R.; Go, V. L. W. (Mayo Clinic, Rochester, MN 55901). *Gut* 16(10):777-780; 1975.

Five healthy men were studied to determine whether a duodenal tube affects the rate of gastric emptying, acid production, and serum gastrin response following the ingestion of an ordinary solid meal. The duodenal tube and a gastric sump tube were placed after an overnight fast, and the subjects were fed a standardized meal containing about 40% carbohydrate, 40% fat, and 20% protein. Water containing polyethylene glycol (labeled with ^{14}C in two subjects) was also given as a nonabsorbable gastric marker. The total volume of gastric contents and the volume of solid food at the time of complete aspiration were not altered significantly by the presence of a transpyloric tube. The curves for gastric marker concentrations, measured sequentially after the meal, were similar regardless of whether the tube extended into the duodenum or not, but in several subjects, the marker dilution was either consistently greater or consistently less when the tube was in the transpyloric position. Mathematical analysis showed no significant differences in gastric marker concentration, pH, titratable acidity or serum gastrin levels attributable to the transpyloric tube. It is concluded that these tubes do not significantly interfere with gastric responses to an ordinary solid meal.

0858 EFFECT OF CIMETIDINE ON 24-HOUR INTRAGASTRIC ACIDITY IN NORMAL SUBJECTS. (Eng.) Pounder, R. E.; Williams, J. G.; Milton-Thompson, G. J.; Misiewicz, J. J. (Central Middlesex Hosp., London, NW10 7NS, England). *Gut* 17(2): 133-138; 1976.

The effect of p.o. administration of cimetidine, a histamine H_2-receptor antagonist on intragstric acidity was studied in nine normal men. Gastric content pH was measured at hourly daytime and two hourly nighttime intervals for 48 hr. The subjects ate identical meals, drank identical volumes of fluid, and smoked the same number of cigarettes during the two study days. Their physical activity was unrestricted in a ward environment. Blood cimetidine and plasma gastrin were measured in serial blood samples. The subjects were treated in random sequence with cimetidine (0.8-1.0 g) p.o. on one day and placebo capsules on the other. The drug was given in four divided doses: four subjects received it before, and five after, the three main meals. All took the fourth dose at bedtime. Replicate studies in an additional subject given placebo on both study days showed good reproducibility ($r=0.80$, $p<0.01$). Cimetidine therapy decreased intragastric acidity in all subjects. The decrease was similar in the two groups taking the drug before or after meals, mean 24-hr intragastric hydrogen ion activity being lowered by 70 and 72%, resp. Nocturnal anacidity was recorded in only 2 of 45 samples. Administration of cimetidine before meals produced earlier and higher drug blood levels than after meals, but when it was taken after food the blood levels were highest at the time when the buffer capacity of the food was waning. Blood concentrations of cimetidine exceeded the secretory IC_{50} level for most of the time between doses. The results show that cimetidine produces a striking and consistent decrease of intragastric acidity. Although variation in the timing of the dose in relation to meals did not affect the decrease of acidity, the absorption data suggest that patients should take the drug after meals.

0859 INHIBITION OF FOOD-STIMULATED GASTRIC ACID SECRETION BY CIMETIDINE. (Eng.) Pounder, R. E.; Williams, J. G.; Russell, R. C. G.; Milton-Thompson, G. J.; Misiewicz, J. J. (Central Middlesex Hosp., London, NW10 7NS, England). *Gut* 17(3):161-168; 1976.

The effect of 200 mg cimetidine, a new histamine H_2-receptor antagonist, on gastric acid secretion stimulated by a homogenized meal was studied in six normal volunteers using an *in vivo* intragastric titration technique. The subjects were studied twice, no more than 48 hr apart, receiving either cimetidine or placebo in random order. Cimetidine administered either 32 min before (three subjects) or with the meal (three subjects) significantly inhibited gastric acid secretion in all subjects; 96 min after food, total acid secretion decreased by 67 and 57%, resp. When the drug was taken with the meal, absorption was slower (mean peak blood level 2.34 μmol/l, 80-128 min after dosing) than when administered on an empty stomach (mean peak blood level 5.08 μmol/l, 48-64 min after dosing). Blood cimetidine concentration correlated significantly ($p<0.01$) with percentage inhibition of acid output. The calculated concentration resulting in 50% inhibition of gastric acid secretion (IC_{50}) was 1.6 μmol/l. Secretion of gastrin in response to food was unaffected by cimetidine. The results suggest that 200 mg cimetidine effectively inhibits food-stimulated acid secretion and that the bioavailability of the drug may be affected by the timing of dosage in relation to meals.

0860 AMINO ACID DECARBOXYLASE ENZYMES--VITAL OR IRRELEVANT TO GASTRIC SECRETION? (Eng.) Henman, F. D. (Res. Dept., Boots Co. Limited, Nottingham NG2 3AA, England). *Digestion* 12(3): 157-178; 1975.

0861 INFLUENCE OF THE POSITION OF THE SIDE CHAIN HYDROXY GROUP ON THE BIOLOGICAL PROPERTIES OF PROSTAGLANDINS. (Eng.) Collins, P. W.; Dajani, E. Z.; Bruhn, M. S.; Brown, C. H.; Palmer, J. R.; Pappo, R. (Searle Lab., P.O. Box 5110, Chicago, IL 60680). *Ter. Arkh.* (48):4217-4220; 1975.

0862 COMPETITION FOR SULPHATE DURING DETOXIFICATION IN THE GUT WALL. (Eng.) Bennett, P. N.; Blackwell, E.; Davies, D. S. (Royal Postgraduate Medical Sch., Ducane Rd., London W12 OHS, U.K.). *Nature* 258(5532):247-248; 1975.

0863 BIOCHEMICAL STUDIES OF THE CONSTITUENTS OF CAMOMILE: III. IN VITRO STUDIES ON THE ANTIPEPSIN ACTIVITY OF (-)-α-BISABOLOL. (Ger.) Isaac, O.; Thiemer, K. (Degussa, 6 Frankfurt/Main 1, Daimlerstr. 25, Germany). *Arzneim. Forsch.* 25(9):1352-1354; 1975.

0864 TWO-SITE MODELS FOR GASTRIN-STIMULATED ACID SECRETION. (Eng.) Moore, E. W.; Makhlouf, G. M.; Schwartz, S. S.; James, A. E., Jr. (Medical Coll. Virginia, Richmond, VA 23298). *Gastroenterology* 69(6):1373-1377; 1975.

0865 EXPERIMENTAL STUDY ON GASTRIC ACID SECRETION AFTER VARIOUS TYPES OF VAGOTOMY AND ANTRECTOMY USING PAVLOV POUCH DOGS. (Eng.) Yama-

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gishi, T. (1st Dept. Surgery, Univ. Tokyo, Tokyo, Japan). *Chir. Gastroenterol.* 9(1):3-14; 1975.

0866 EFFECT OF AMODIAQUINE ON GASTRIC HISTAMINE METHYLTRANSFERASE AND ON HISTAMINE-STIMULATED GASTRIC SECRETION. (Eng.) Barth, H.; Lorenz, W.; Troidl, H. (Surgical Clinic, Univ. Marburg, D-3550 Marburg/Lahn, Robert-Koch-Strasse 8, Germany). *Br. J. Pharmacol.* 55(3):321-327; 1975.

0867 METIAMIDE: AN ANTAGONIST OF HISTAMINE-STIMULATED GASTRIC ACID SECRETION. (Eng.) Magee, D. F. (Creighton Univ. Sch. Medicine, 2500 California St., Omaha, NB 68178). *Ann. Surg.* 182(5): 627-629; 1975.

0868 EFFECT OF PENTAGASTRIN AND CAERULEIN ON INTRAGASTRIC PRESSURE IN THE DOG. (Eng.) Valenzuela, J. E.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp., Los Angeles, CA 90073). *Gastroenterology* 69(6):1383-1384; 1975.

0869 THE IN VIVO METABOLISM OF $[^{14}C]$HISTAMINE DURING PENTAGASTRIN-STIMULATED ACID SECRETION IN THE CAT. (Eng.) Bunce, K. T.; Lake, H. J. (Dept. Physiology, Univ. Newcastle upon Tyne, NE1 7RU, England). *J. Physiol.* 252(2):75p-76p; 1975.

0870 EFFECTS OF FASTING, STRESS AND DRUGS ON GASTRIC GLYCOPROTEIN SYNTHESIS IN THE RAT. (Eng.) Dekanski, J. B.; MacDonald, A.; Sacra, P.; Parke, D. V. (Biorex Lab. Ltd., Canonbury Villas, London, N1 2HB, England). *Br. J. Pharmacol.* 55(3): 387-392; 1975.

See also, 0793, 1092, 1132.

SECRETION AND METABOLISM

Pancreas

0871 BICARBONATE AND CYCLIC AMP CONTENT OF PURE HUMAN PANCREATIC JUICE IN RESPONSE TO GRADED DOSES OF SYNTHETIC SECRETIN. (Eng.) Domschke, S.; Domschke, W.; Rosch, W.; Konturek, S. J.; Wunsch, E.; Demling, L. (Dept. Medicine, Univ. Erlangen-Nuremberg, Krankenhausstrasse 12, D-852 Erlangen, W. Germany). *Gastroenterology* 70(4):533-536; 1976.

Cyclic AMP and bicarbonate concentrations in pure pancreatic juice were studied to determine their correlation during i.v. infusion of increasing doses of synthetic secretin in seven healthy volunteers (5 men and 2 women, aged 26-44 yr). Pancreatic juice was obtained by endoscopic cannulation of the papilla of Vater. Synthetic secretin was infused i.v. in doses doubled every 20 min. The volume of pancreatic juice was proportional to the log of the secretin dose. A significant rise in pancreatic juice flow was elicited at a dose as low as 8.05 ng/kg/hr. Maximum flow rate approximating 250 µl/5 min/kg was attained during infusion of 129 ng/kg/hr. At the same dose maximal bicarbonate outputs averaging 383 µEq/hr/kg of body weight were obtained, whereas bicarbonate ion concentration approached peak values (135 µEq/ml) at 32.2 ng/kg/hr. Bicarbonate concentrations showed a tendency to fall at supramaximal doses. The effect of increasing secretin doses on bicarbonate and cyclic AMP concentrations was remarkably similar, suggesting the participation of cyclic AMP in human pancreatic bicarbonate secretion.

0872 EFFECTS OF CALCITONIN ON THE SECRETION OF PANCREATIC JUICE INDUCED BY DOPAMINE, SECRETIN AND PANCREOZYMIN. (Eng.) Iwatsuki, K.; Hashimoto, K. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Clin. Exp. Pharmacol. Physiol.* 3(2):159-165; 1976.

The effects of calcitonin on dopamine-, secretin- and pancreozymin-induced pancreatic secretion were investigated in the isolated blood-perfused pancreas of 12 mongrel dogs. The volume of pancreatic secretion induced by pancreozymin given intra-arterially (i.a.) was decreased by an i.a. infusion of 1 U/min of calcitonin, but that induced by dopamine or secretin given i.a. was not affected by calcitonin treatment. Amylase concentration in pancreatic juice either in spontaneous secretion in the resting state or in that of stimulated secretion by pancreozymin was decreased approximately 30% by calcitonin treatment, but amylase concentration in pancreatic juice induced by dopamine or secretin was not affected. Calcitonin had no effect on bicarbonate concentration in pancreatic juice stimulated by these secretagogues. Calcium concentration in pancreatic juice in the resting state was reduced about 36% by calcitonin treatment. Calcitonin caused a decrease in a calcium concentration in the pancreozymin-induced secretion, but did not cause any change in the dopamine- or secretin-induced one. These results suggest that calcitonin may affect the secretory mechanism of the acinar cells but not that of the ductular cells, and that the acinar cells are active even in the resting state.

0873 ROLE OF CHOLINERGIC MECHANISMS IN THE RESPONSE TO SECRETIN OF ISOLATED CANINE PANCREAS. (Eng.) Vaysse, N.; Bastie, M. J.; Pascal, J. P.; Roux, P.; Martinel, Ch.; Lacroix, A.; Ribet, A. (CHU Rangueil Bat L3, 31400 Toulouse Cedex, France). *Gastroenterology* 69(6):1269-1277; 1975.

The effects of carbamylcholine (CCH, 100 μg/hr) and atropine (0.25, 1.0, and 10.0 mg/hr) on the response of the canine exocrine pancreas to secretin (0.1, 0.5, and 5.0 clinic U/hr) were studied using isolated pancreas perfused with whole heparin-treated blood. The pancreas was removed, separated from duodenum, and perfused through the superior mesenteric artery and celiac trunk. Five procedures were followed: 1) a continuous infusion of secretin administered at graded doses (0.2, 1.0, and 10.0 clinic U/hr), 2) a continuous infusion of cholecystokinin (200 μg/hr), 3) a continuous infusion of secretin followed by an infusion of CCH, 4) an infusion of atropine followed by secretin and CCH, and 5) the pancreas was stimulated by CCH or cholecystokin-pancreozymin under a background of secretin. CCH induced a sharper decrease in D_{50} (dose of secretin which elicits half the calculated maximal response) but no increase in maximal response to secretin. This potentiating effect was partially due to vasomotor modifications and chiefly to the action of CCH on the receptor of secretin. Large doses of atropine (10 mg/hr) were necessary to abolish a CCH-induced enzyme response. However, no dose of atropine was able to significantly alter the enzyme response to secretin and/or cholecystokinin-pancreozymin. Although the results indicate that cholinergic tone is not necessay for secretin-induced hydrelatic response to occur, it demonstrates that this cholinergic tone plays a major role in modulating the pancreatic response to a submaximal dose of secretin.

0874 EFFECTS OF SOMATOSTATIN ON PANCREATIC EXOCRINE FUNCTION. INTERACTION WITH SECRETIN. (Eng.) Robberecht, P.; Deschodt-Lanckman, M.; De Neef, P.; Christophe, J. (Brussels Univ. Sch. Medicine, 1000 Brussels, Waterloo Blvd., 115, B-Belgium). *Biochem. Biophys. Res. Commun.* 67(1):315-323; 1975.

The effects of somatostatin on pancreatic hydrolase release, were investigated *in vivo* and *in vitro* in male Wistar rats. α-Amylase was determined in pancreatic fragments by an automated saccharogenic method and lipase by an automated potentiometric single-time-point assay. *In vivo*, a 50 μg/100 g body weight bolus i.v. injection of somatostatin provoked a rapid and significant three- to fourfold increase in amylase and lipase output. The effect remained high for at least 20 min following the injection. *In vitro*, there was a twofold increase 2 min after addition of 10^{-6} M somatostatin; the stimulation persisted for 10 min. The increase was significantly lower than the 3.8- and 5.0-fold increase obtained, resp., with 10^{-6} M secretin and 10^{-6} M pancreozymin. Somatostatin exerted moderate effects on cyclic AMP levels; increases were significant only at 10^{-6} M (+35%). However, somatostatin did inhibit the rise in cyclic AMP induced by secretin. These findings are compatible with the hypothesis that, when utilized alone, somatostatin occupies secretin binding sites and consequently activates adenylate cyclase that may facilitate hydrolase output. When somatostatin and secretin are both present, somatostatin inhibits the effect of secretin on cyclic AMP. The authors conclude that somatostatin is probably an analog of secretin in the exocrine pancreas. It works as an inhibitor or an agonist of secretin depending on peptide concentrations.

0875 MODIFICATION OF PANCREATIC RIBONUCLEASE ACTIVITY IN COMPLEXES WITH POLYANIONS. (Rus.) Ponomareva, R. B.; Kavunenko, A. P.; Kalatcheva, T. N.; Tikhomirova-Sidorova, N. S.; Samsonov, G. V. (Inst. High Molecular Compounds, Acad. Sciences USSR, Leningrad, USSR). *Biokhimiia* 40(3):468-474; 1975.

0876 PROTEIN TRANSPORT BY THE PANCREAS: THE CURRENT PARADIGM IS ANALYZED AND AN ALTERNATIVE HYPOTHESIS IS PROPOSED. (Eng.) Rothman, S. S. (Dept. Physiology, Univ. California, San Francisco, CA 94143). *Science* 190(4216):747-753; 1975.

0877 BEHAVIOUR OF THE DUCT-LIGATED CANINE PANCREAS DURING HYPOTHERMIC ALBUMIN PERFUSION. (Eng.) Brynger, H.; Claes, G. (Dept. Surgery, Univ. Goteborg, Goteborg, Sweden). *Eur. Surg. Res.* 7(4/5):287-296; 1975.

0878 SPONTANEOUS EXTERNAL SECRETION OF AN AUXILIARY DUODENOPANCREATIC ALLOGRAFT IN THE DOG. (Fre.) Camelot, G.; Kahn, J.; Elbaz, J.; Etievent, J.; Boillot, A.; Benedini, M.; Henry, J. C.; Gillet, M. (Faculte de Medecine, place Saint-Jacques, 25030 Besancon Cedex, France). *C. R. Soc. Biol. (Paris)* 168(6/7):866-870; 1974.

See also, 0789, 0855, 0914.

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SECRETION AND METABOLISM

Hepatobiliary Tract

0879 CHARACTERIZATION OF RAT LIVER CELL PLASMA MEMBRANES. (Eng.) Fisher, M. M.; Bloxam, D. L.; Oda, M.; Phillips, M. J.; Yousef, I. M. (Dept. Pathology, Univ. Toronto, Toronto, Ontario Canada). *Proc. Soc. Exp. Biol. Med.* 150(1):177-184; 1975.

Preparation of pure fractions of noncanalicular liver cell plasma membranes (PM) and bile canalicular membranes (BCM) of male Wistar rats, based on different behavior in sucrose gradients, is described and some characteristics of the two fractions are reported. Glucose-6-phosphatase activity, normally confined to endoplasmic reticulum, was absent from both BCM and PM, suggesting no microsomal contamination. 5'-Nucleotidase was enriched over 20-fold in the PM and more than 80-fold in the BCM. Leucyl-β-naphthylamidase was located mainly in the BCM fraction. The lower than expected recoveries of 5-nucleotidase activity in the BCM + PM (20% of the total activity in the liver) and leucyl-β-naphthylamidase (5% of total liver activity) was thought to be due to their presence in subcellular elements other than BCM and PM and to losses during preparation. Chemical studies showed BCM to contain more than twice the amount of total lipid on a protein basis than did PM. Total phospholipid and cholesterol were also higher in BCM, but the composition of the phospholipids was similar in both fractions. Polyacrylamide gel electrophoresis of the protein components of the two membranes resulted in more than 20 bands, and differences between the two were apparent. Both fractions contained peptides with apparent molecular weights of 10 x 10^3 to 270 x 10^3. Both membranes contained proteins, mostly less than 160 x 10^3. The differences in lipid and protein composition are thought to be related to the different functions of the two membranes.

0880 CHANGES IN SUBCELLULAR DISTRIBUTION OF *S*-ADENOSYLMETHIONINE DECARBOXYLASE IN REGENERATING AND IN DEVELOPING RAT LIVER. (Eng.) Sturman, J. A.; Gaull, G. E. (Inst. Basic Res. Mental Retardation, Staten Island, NY). *Biochim. Biophys. Acta* 428(1):70-77; 1976.

Distribution of the activity of *S*-adenosylmethionine decarboxylase in homogenates of Nelson-Wistar rat liver regenerating after partial hepatectomy and during development was studied. Total *S*-adenosylmethionine decarboxylase activity was extracted into the supernatant fractions of homogenates in buffer containing Triton X-100. In the stages of rapid growth of liver remaining after partial hepatectomy, an increased activity of *S*-adenosylmethionine decarboxylase in the supernatant fractions was accompanied by a decreased activity in the crude nuclear fractions. In the liver of the developing rat, prior to birth, all activity of *S*-adenosylmethionine decarboxylase was in the supernatant fraction. After birth, activity in the crude nuclear fraction increased rapidly, reaching adult values by the end of weaning. These findings support the hypothesis that *S*-adenosylmethionine decarboxylase in rat liver may have a function other than synthesis of spermidine.

0881 ENERGY WASTAGE IN RATS GIVEN DRUGS THAT INDUCE MICROSOMAL ENZYMES. (Eng.) Pirola, R. C.; Lieber, C. S. (Veterans Admin. Hosp., 130 W. Kingsbridge Rd., Bronx, NY 10468). *J. Nutr.* 105(12):1544-1548; 1975.

Metabolic efficiency was studied in littermate pairs of Sprague-Dawley rats that were given drugs to induce hepatic microsomal enzymes. Rats received a liquid diet containing 36% energy as ethanol, or were injected i.p. with 80 mg/kg/day phenobarbital for 4 days, and/or received 2 i.p. injections 10 hr apart of 100 mg/kg hexobarbital. The presence of an increased metabolic rate was indicated by increases in oxygen consumption and by changes in body weight. In rats fed ethanol, the gain in weight was 26% less than in controls. Treatment with barbiturates increased metabolic rates. In the absence of any drug, induced animals showed a 7.9% greater oxygen consumption than controls. There was a 12.9% increase during hexobarbital anesthesia. Between 8-48 hr after the last injection of phenobarbital, treated rats had a 15% greater weight loss than controls. The results support the hypothesis that hepatic microsomal enzyme induction can significantly alter the body's metabolic efficiency.

0882 COMPUTER SIMULATION OF SULFOBROMOPHTHALEIN KINETICS IN THE RAT USING FLOW-LIMITED MODELS WITH EXTRAPOLATION TO MAN. (Eng.) Montandon, B.; Roberts, R. J.; Fischer, L. F. (Univ. Iowa, Sch. Medicine, Iowa City, IA 52242). *J. Pharmacokinet. Biopharm.* 3(4):277-290; 1975.

A linear, flow limited mathematical model of drug kinetics was used to simulate total BSP kinetics in normal anesthetized male Thorp Sprague-Dawley rats during i.v. infusions (200 nmol/min/kg for 50 min) and following rapid i.v. injections. Four parameters were used to characterize the distribution and biliary and urinary excretion of BSP: liver-to-plasma concentration ratio, extrahepatic tissue-to-plasma concentration ratio, liver clearance rate constant, and renal plasma clearance rate constant. Mean output of BSP in bile was 76%. Only 0.1% of the BSP was found in the urine. Renal plasma clearance was 0.004 ml/min, while hepatic plasma clearance was 3.6 ml/min. The mean concentration of BSP observed in the bile at the end of the infusion was 2600 nmol/ml, while the mean plasma concentration was 9.1 nmol/ml. Results at other infusion rates (50-2400 nmol/min/kg) indicated that there was no apparent saturation of total BSP excretion at these rates. The graphs of the simulated variables fell well within the ranges of observed values. The same model conception and equations that were used for rats were also used to model total BSP kinetics in a 70-kg man. The simulated plasma levels corresponded to the observed plasma levels. The results show that there do not appear to be important differences between the rat and human species in the factors controlling the elimination of BSP from the body.

0883 REGULATION OF PHOSPHOLIPID BIOSYNTHESIS IN ISOLATED RAT HEPATOCYTES. EFFECT OF DIF-
FERENT SUBSTRATES. (Eng.) Sundler, R.; Akesson, B. (Dept. Physiological Chemistry, Univ. Lund, S-220 07 Lund 7, Sweden). *J. Biol. Chem.* 250(9):3359-3367; 1975.

The effects of choline, ethanolamine, and its *N*-methyl analogs, different fatty acids, and L-methionine on phospholipid biosynthesis via the CDP-
ester pathways and the methylation pathway were
studied in rat hepatocytes. Phosphatidylethanol-
amine synthesis was stimulated severalfold by 0.02
to 0.1 mM ethanolamine, especially in the presence
of long chain unsaturated fatty acids. At higher
concentrations of ethanolamine, phosphorylethanol-
amine accumulated, but the level of CDP-ethanolamine
and the rate of phosphatidylethanolamine synthesis
lid not increase further. The rate of phospha-
idylcholine synthesis via the CDP-ester pathway
esponded in a way analogous to that of phosphati-
lylethanolamine synthesis upon the addition of cho-
ine and fatty acid, except that a 10- to 20-fold
igher concentration of choline was required for
aximal stimulation. Phospholipids containing *N*-
onomethyl- or *N*,*N*-dimethylethanolamine were ef-
iciently formed from the corresponding free bases
n the absence of ethanolamine and choline. Eth-
nolamine, but no other bases, completely inhibited
hospholipid formation from *N*-monomethylethanolamine.
he data indicate that the cytidylyltransferase re-
ctions are rate-limiting steps in the synthesis of
hosphatidylethanolamine and probably also phos-
hatidylcholine. The availability of diacylglycerol
nd its fatty acid composition may also significantly
ffect the rate of phospholipid synthesis. The rate
f phosphatidylcholine formation via phospholipid
-methylation approximately doubled when L-methionine
as added at concentrations similar to that in rat
lasma. The rate of phosphatidylcholine synthesis
ia this pathway was 20-40% of that via diacyl-
lycerols and CDP-choline. The methylation of phos-
hatidylethanolamine to phosphatidylcholine remained
ssentially constant when the rate of phosphati-
ylethanolamine synthesis was varied eightfold but
as significantly reduced when the formation of *N*-
onomethyl- or *N*,*N*-dimethylphospholipid was stimulated
addition of the corresponding base. These phospho-
ipids replaced phosphatidylethanolamine as the sub-
rate for methylation and increased the rate of
osphatidylcholine formation via this pathway.

384 THE INFLUENCE OF THE POSITION OF THE OXYGEN DISSOCIATION CURVE ON OXYGEN-DEPENDENT
NCTIONS OF THE ISOLATED PERFUSED RAT LIVER. I.
UDIES AT DIFFERENT LEVELS OF HYPOXIC HYPOXIA.
ng.) Bakker, J. C.; Gortmaker, G. C.; Vrolijk,
C. M.; Offerijns, F. G. J. (Central Lab. Nether-
nds Red Cross Blood Transfusion Service, P.O. Box
90, Amsterdam, The Netherlands). *Pfluegers Arch.*
2(1):21-31; 1976.

The influence of the 2,3-diphosphoglycerate (2,3-DPG) content of RBC on oxygen-sensitive parameters of the liver under conditions of hypoxia was studied. Isolated Wistar rat livers were perfused with fresh and 2,3-DPG-depleted human RBC at different levels of hypoxia. The mean P_{50} values of the measured actual oxygen dissociation curves (ODC) were 24.5 and 18 mm Hg. No changes in flow rate and perfusion pressure occurred under the different experimental conditions. The advantage or disadvantage of a shift of the ODC depended upon the degree of hypoxia, as reflected in the venous pO_2. Perfusions with fresh RBC showed higher venous pO_2 values during normoxia or moderate hypoxia and lower venous pO_2 values at severe hypoxia. A cross-over point was found at a pO_2 of 36 mm Hg in the portal vein. The disadvantage of perfusions with fresh RBC in severe hypoxia was also reflected in higher cytoplasmatic and mitochondrial redox levels. Using bile flow rate as an indirect measure for the rate of hydroxylation-dependent O_2 consumption, a favorable effect of perfusion with fresh RBC was found at a pO_2 of 100 and 40 mm Hg in the portal vein.

0885 SECRETIN-INDUCED BILE SECRETION, BILE ACID OUTPUT AND BLOOD SUPPLY TO THE LIVER IN THE DOG. (Eng.) Brunner, H.; Slat, B.; Kretschmer, G.; Funovics, J.; Grabner, G. (Section of Gastroenterology II, Univ. Vienna, Vienna, Austria). *Eur. Surg. Res.* 7(4/5):205-211; 1975.

Bile secretion and blood flow in the portal vein and the hepatic artery were determined in 16 cholecystectomized anesthetized mongrel dogs before and during continuous infusion of varying doses of secretin. Four groups of four animals were studied, each dog received one dose of secretin: group 1, 0.5 U/kg body weight; group 2, 2 U/kg; group 3, 4 U/kg; or group 4, 8 U/kg. Basal bile flow in the four groups did not differ. Secretin-stimulated flow rose significantly in all cases, but bile acid output was not altered. Basal total liver blood flow of the four groups was equal. Mean hepatic arterial flow was 7.3 ± 1.7 ml/min/kg body weight, while basal portal flow was 32.7 ± 10.4 ml/min/kg. No change in liver blood flow was observed at the lower doses of secretin (0.5 or 2 U/kg). The higher doses, 4 and 8 U/kg, resulted in significant increases of liver blood flow to 46.9 ± 10.4 ml/min/kg and 57.4 ± 25.8 ml/min/kg, resp. Hepatic arterial flow remained unchanged. It is concluded that secretin action on liver blood flow mirrors mainly superior mesenteric arterial vasodilation and seems to be a pharmacologic rather than a physiologic response. Bile secretion is not influenced by changes of hepatic blood flow in the physiologic range.

0886 BILE-SALT METABOLISM IN THE PRIMATE FETUS. (Eng.) Little, J. M.; Smallwood, R. A.; Lester, R.; Piasecki, G. J.; Jackson, B. T. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Gastroenterology* 69(6):1315-1320; 1975.

Fetal bile salt metabolism was assessed by constant i.v. infusion of trace amounts of $[^{14}C]$cholate

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through a fetal jugular vein catheter into six rhesus monkeys over a 6-hr period. The concentration of radiolabel was measured during infusion and for 4 hr after infusion. Radiolabel in bile, plasma, and tissues was assayed by liquid scintillation counting, and individual bile salts in bile, plasma, and tissues were isolated, identified, and quantitated by thin layer and gas liquid chromatography. Placental transfer averaged 30% of the injected dose, while biliary excretion averaged 36%. Of the amount excreted by the fetal liver, 78% was in the form of $[^{14}C]$taurocholate. The findings suggest that bile salt metabolic and excretory mechanism are undergoing developmental maturation at birth.

0887 THE HETEROGENEITY OF DERMATAN SULFATE AND HEPARAN SULFATE IN RAT LIVER AND A SHIFT IN THE GLYCOSAMINOGLYCAN CONTENTS IN CARBON TETRACHLORIDE-DAMAGED LIVER.

(Eng.) Suzuki, S.; Suzuki, S.; Nakamura, N.; Koizumi, T. (Faculty Science, Nagoya Univ., Nagoya 464, Japan). *Biochim. Biophys. Acta* 428(1):166-181; 1976.

Studies were undertaken to demonstrate the occurrence in rat liver of two dermatan sulfate pools, distinguishable by their characteristic composition and their biological properties. The glycosaminoglycan of Sprague-Dawley rat liver can be separated into five distinct fractions; a hyaluronic acid fraction, a heparan sulfate fraction with a molar ratio of sulfate to hexosamine (S/HexN) of approximately 0.7, a heparan sulfate fraction with a S/HexN ratio of about 1.4, a dermatan sulfate fraction with a S/HexN ratio near unity, and a dermatan sulfate fraction with a S/HexN ratio of approximately 1.3. Enzymatic analysis of the two dermatan sulfate fractions indicated that they differ significantly in that the high sulfated fraction contains relatively more *N*-acetylgalactosamine 4,6-bissulfate units (about 26% of the total hexosamine). In experimental injury produced by carbon tetrachloride (rats inhaled CCl_4 for 10 min, twice a week for 8 weeks), the low sulfated fraction increased as much as ninefold on a dry weight basis, bearing no linear relationship to the amount of the high sulfated fraction, which increased only twofold. A significant shift was also observed in the levels of the two heparan sulfate fractions. In this case, however, the high sulfated fraction showed a much more pronounced increase than did the low sulfated fraction. These observations suggest that for each of the dermatan sulfate and heparan sulfate classes, there are at least two pools, distinguished by sulfation degree and perhaps by turnover rate and physiological function.

0888 STUDIES ON THE INHIBITION OF EXPERIMENTAL LIVER FIBROSIS: 2. THE MECHANISM OF THE INHIBITION OF LIVER FIBROSIS OF RATS DUE TO CARBON TETRACHLORIDE BY ELASTASE.

(Eng.) Tsujii, T.; Fukuhara, M.; Fukuda, S.; Matsui, T.; Matsuoka, Y.; Tamura, M.; Morita, T.; Kimura, K.; Moriya, W. (Nara Medical Univ., 840 Shijocho Kashihara Nara, 634 Japan). *Gastroenterol. Jpn.* 10(3):215-224; 1975.

To clarify the mechanism of elastase inhibition of liver fibrosis, the activity of lysosomal enzymes in elastase-treated and untreated male Sprague-Dawley rats was determined during the development of and recovery from liver fibrosis. Chronic liver injury was produced by the s.c. injection of 0.3 ml of olive oil solution of 50% CCl_4/100 g twice weekly. One group of animals was given 0.4 mg/100 g 100% pure elastoproteinase s.c. daily in combination with CCl_4 for 3, 6, 10, 15, and 20 weeks. Another group was given CCl_4 alone until the 10th week, when both substances were administered. A third group was given CCl_4 alone for 20 weeks and then elastase was administered for 4 weeks. Lysosomal enzyme activity was determined by measuring β-glucuronidase, cathepsin, and collagenolytic activity. In addition, elastase was caused to act *in vitro* upon the substrat comprising mixed collagen of acid soluble collagen and neutral soluble collagen extracted from the skin of the guinea pig. No marked differences in lysosomal enzyme activity were noted between any of the elastase-treated groups and those treated with CCl_4 alone. It is concluded that the inhibition of liver fibrosis does not occur through the activation of lysosomal enzyme by elastase. Disc electrophoretic observation of the performance of elastase on the collagen revealed that β-component of collagen disappeared, but that the α-component remained. Thus, inhibition of liver fibrosis by elastase may be due to a direct effect of elastase on the telopeptide portion of collagen.

0889 THE EFFECT OF ETHANOL INGESTION ON THE ALDEHYDE DEHYDROGENASES OF RAT LIVER.

(Eng.) Greenfield, N. J.; Pietruszko, R.; Lin, G.; Lester, D. (Center Alcohol Studies, Rutgers Univ., New Brunswick, NJ 08903). *Biochim. Biophys. Acta* 428(3):627-632; 1976.

The effect of ethanol ingestion on aldehyde dehydrogenase activity in the subcellular fractions of livers from 14 pair-fed male Sprague-Dawley rats was tested. Enzymatic assays were performed at two different concentrations of propionaldehyde (0.068 and 13.6 mM), sufficient to saturate enzymes with high and low affinities for propionaldehyde, resp. The test rats were fed a diet containing ethanol at an average consumption of 12 g/kg/day. During the following day, the control animals received the same diet substituting isocaloric amounts of carbohydrat for the ethanol. These rats were maintained on the diets for about 60 days. The effect of alcohol ingestion varied depending upon the subcellular fraction tested and the concentration of propionaldehyd There was a 60% increase in the activity of aldehyd dehydrogenase with high affinity for propionaldehyd in the mitochondrial membranes. Conversely, there was a 50% decrease in the activity of aldehyde dehydrogenases with high affinity for propionaldehyde in the microsomal fraction. There was also a 58% decrease in the activity of enzymes from the mitochondrial matrix with low affinity for propionaldehyde. The findings suggest that differences in the assay systems employed by previous investigators ma account for the conflicting results on the effect of ethanol feeding.

890 ETHANOL METABOLISM AND LIPID SYNTHESIS BY ISOLATED LIVER CELLS FROM FED RATS. (Eng.)

elmer, J.; Grunnet, N. (Dept. Biochemistry A, Univ.
openhagen, DK-2200 Copenhagen N, Denmark). *Biochim.*
iophys. Acta 428(1):123-137; 1976.

he acute effects of low and high concentrations of
thanol and of fructose, either alone or in combina-
ion with ethanol, on the rate of lipid synthesis
ere studied. The fatty acid synthesis in isolated
iver cells from fed Wistar rats was studied with
ritiated water as the radioactive precursor. The
ells incorporated ^3H_2O at a rate of 1.26 μmol/min/
packed cells. Addition of ethanol caused a 20%
ecrease in the incorporation of tritium into fatty
cids. The decrease was correlated to the increase
the NAD-redox level. The decreased tritium
corporation into fatty acids during ethanol metab-
lism was probably due to a decrease in the specific
tivity of the NADPH used for the synthesis of fatty
ids, rather than to a real inhibition of the fatty
id synthesis. Ethanol oxidation via NADPH-con-
ming pathways and 80 mM ethanol had no effect
on the incorporation of tritium into fatty acids.
uctose (15 mM) inhibited the fatty acid synthesis
75%, and this inhibition was further augmented
ethanol. The isolated rat liver cells oxidized
hanol at a rate of 2.72, 2.93, and 3.48 μmol/min/g
cked cells at 5, 20, and 80 mM ethanol, resp.
uctose had no effect upon ethanol oxidation.
hanol oxidation via the nonalcohol dehydrogenase
thway(s) may involve a transfer of reducing equiv-
ents from mitochondrial NADH to cystolic $NADP^+$,
judged from measurements of metabolite levels.
is is supported by determinations of ^{14}C yield in
ucose from [1-^{14}C]ethanol, and the results are
idence for the presence of hydrogen shuttle activity
ring metabolism of ethanol, catalyzed by the NADH-
pendent alcohol dehydrogenase. A metabolic scheme
proposed to account for the observed changes at
and high concentrations of ethanol.

91 ACUTE EFFECTS OF ORAL AND INTRAVENOUS ETHANOL ON RAT HEPATIC ENZYME ACTIVITIES. (Eng.)

ifel, F. B.; Greene, H. L.; Lufkin, E. G.; Wrensch,
R.; Hagler, L.; Herman, R. H. (Letterman Army
t. Res., Presidio San Francisco, CA 94129). *Bio-*
m. Biophys. Acta 428(3):633-638; 1976.

acute effects of ethanol, alone, and in combina-
n with folic acid, on certain hepatic enzyme ac-
ities and on cyclic AMP concentration were stud-
in male Carworth rats. Administration of 95%
anol (3 ml, 12 ml total volume, p.o.) over a 2-
period significantly decreased plasma glucose
insulin levels and the activities of the gluco-
genic enzymes, pyruvate carboxylase and fructose
hosphatase, and one glycolytic enzyme, fructose-
-P_2 aldolase. In each instance, the p.o. admin-
ration of folate (2,400 μg/day), in conjunction
h the ethanol, prevented these alterations in car-
ydrate metabolism. Intravenous injection of
anol produced a rapid decrease (within 10-15 min)
the activities of hepatic phosphofructokinase,
uvate kinase, fructose diphosphatase, and fruc-
e-1,6-P_2 aldolase. Intravenously administered
anol significantly increased hepatic cyclic AMP
concentration by approximately 60% within 10 min, while p.o. ethanol did not alter hepatic cyclic AMP concentrations. These data confirm the known antagonism between ethanol and folate and suggest that p.o. folate might offer a protective effect against hypoglycemia in rats receiving ethanol.

0892 EFFECTS OF LONG-TERM ETHANOL TREATMENT ON ALDEHYDE AND ALCOHOL DEHYDROGENASE ACTIVITIES IN RAT LIVER. (Eng.)

Koivula, T.; Lindros, K. O. (Dept. Medical Chemistry, Univ. Helsinki, 00170 Helsinki 17, Finland). *Biochem. Pharmacol.* 24(21):1937-1942; 1975.

Effects of long term ethanol administration, either by intubation or as a constituent of the diet, on aldehyde dehydrogenase activity (ADA) in various subcellular fractions of liver were investigated in male Sprague-Dawley rats. The administration by gavage of 5 g ethanol/kg body weight to 11 rats or 6.6 g ethanol/kg to 8 rats for 3 weeks caused weight loss and reduced hepatic ADA in the soluble, mitochondrial, and microsomal fractions. Rats receiving equivalent amounts of ethanol as part of a liquid diet for 5 weeks gained weight and showed no changes in ADA. Alcohol dehydrogenase activity was decreased in the rats treated by gavage and was unchanged in those given ethanol in the diet. However, the rate of ethanol elimination was accelerated in both groups. In the livers of two strains of rats genetically selected for their difference in voluntary alcohol consumption, the mitochondrial and microsomal ADA was shown to be significantly higher in the alcohol-consuming than in the alcohol-avoiding (ANA) rats. Similar differences were found after long term intragastric ethanol administration, although in both strains, the absolute levels of aldehyde dehydrogenase were reduced. Profound reduction of mitochondrial low K_m ADA and high blood acetaldehyde were observed, especially in the ANA rats. This suggests a possible connection between the low activity of this enzyme and the increased acetaldehyde level.

0893 STUDIES ON THE MECHANISM BY WHICH HEPATIC CITRATE SYNTHASE ACTIVITY INCREASES IN VITAMIN B_{12} DEPRIVATION. (Eng.)

Mukherjee, A.; Srere, P. A.; Frenkel, E. P. (Veterans Admin. Hosp., Dallas, TX 75216). *J. Biol. Chem.* 251(7):2155-2160; 1976.

Possible mechanisms that cause increased hepatic citrate synthase activity in vitamin B_{12} deprivation were investigated in Sprague-Dawley rats. Immunochemical titrations of the affinity chromatography-purified enzyme obtained from livers demonstrated that this increased activity was the result of a true increase in enzyme protein content. When fixed ratios of aliquots of normal and B_{12}-deprived rat liver homogenates were mixed, the measured activity showed no change from the expected total citrate synthase activity based on the admixture ratios. Partial purification of the enzyme resulted in the expected recovery of the enzyme at each of the purification steps. Thus, it is unlikely that the change in enzyme activity in B_{12} deprivation was due to the pre-

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sence of a soluble or easily dissociable normally occurring activator or inhibitor. Ouchterlony double diffusion studies, immunochemical titration, and determination of K_m values for oxalacetate and acetyl coenzyme A (substrates for citrate synthase) and K_i values for ATP (inhibitor of citrate synthase) indicated that the enzyme from the B_{12}-deprived livers was structurally the same as that from normal livers. Hepatic citrate synthase degradation rate constants were shown to be essentially unchanged in B_{12} deficiency. The rate of hepatic citrate synthase synthesis, under steady state conditions, was shown to be 2.8-fold greater in the B_{12}-deficient animal than in the normal animal. The increased rate of synthesis appeared to explain the increased enzyme content. Finally, no change in specific activity of the enzyme was seen in brain, heart, or kidney in the B_{12}-deprived animal.

0894 BIOCHEMICAL AND ULTRASTRUCTURAL HEPATIC CHANGES DURING VITAMIN B_{12} DEFICIENCY IN ANIMALS AND MAN. (Eng.) Frenkel, E. P.; Mukherjee, A.; Hackenbrock, C. R.; Srere, P. A. (Southwestern Medical Sch., Dallas, TX 75235). *J. Biol. Chem.* 251 (7):2147-2154; 1976.

Changes in hepatic enzymes of fatty acid synthesis and ultrastructural hepatic changes were studied during vitamin B_{12} deficiency in two patients and in rats. Three groups of rats received a normal diet, a vitamin B_{12}-deficient diet, or a vitamin B_{12}-deficient diet supplemented by i.m. injections of 100 μg of vitamin B_{12} once weekly. Total and specific ATP citrate lyase was nearly threefold greater in the B_{12}-deprived group than in other rats on the normal diet. This increase was also seen in enzymes from hepatic biopsy specimens taken from the two human patients with vitamin B_{12} deficiency. In the rats receiving B_{12} injections, ATP citrate lyase activity was only slightly greater than that seen in the animals on the normal diet. Total and specific activity of hepatic citrate synthase was also found to be increased in B_{12}-deprived animals and man. The activity of hepatic succinate-cytochrome *c* reductase was unchanged in B_{12} deficiency. Vitamin B_{12} deficiency resulted in an increase in hepatic mitochondrial cristae membranes in both rats and man. Histochemical and chemical analysis demonstrated increased glycogen in the liver cells from B_{12}-deficient rats and man. There is thus an increased activity of the otherwise highly constant Krebs cycle enzyme citrate synthase in livers from vitamin B_{12}-deficient animals and humans, and increased mitochondrial cristae membranes.

0895 PROTECTIVE EFFECT OF STEROIDS ON LIVER ISCHEMIA. (Eng.) Delpin, E. A. S.; Figueroa, I.; Lopez, R.; Vazquez, J. (Univ. Puerto Rico Medical Sch., San Juan, Puerto Rico). *Am. Surg.* 41(11):683-695; 1975.

The protective effect of methylprednisone (MP) against ischemia of the liver was studied in 146 rabbits under methohexital anesthesia, and following that, in four human subjects. All animals subjected to occlusion of only the portal vein survived, but when all elements of inflow circulation were occluded for 30 min, the survival was only 10%. However, if MP (30 mg/kg, i.v.) was administered 10-15 min prior to a 30 min occlusion, all animals survived; when drug administration was delayed until after occlusion, only 56% survived. All animals in which occlusion was maintained for 1 hr died, regardless of MP treatment. Eight hr after occlusion, serum levels of alkaline phosphatase, LDH, and SGOT were markedly elevated. LDH and serum bilirubin were more abnormal in the MP-treated animals. At 24 hr after occlusion, all values were approaching normal. Marked histologic changes were observed in the livers of untreated occluded animals by light and electron microscopy, but these changes were minimal in the animals treated with MP. The four human subjects required occlusion of the portal triad for surgical repair. Two were treated with 30 mg/kg MP prior to occlusion and the other two received 1 g each, i.v. It is concluded that MP probably contributed to a smooth and stable early postoperative period.

0896 MODIFICATION OF THE CEREBROVASCULAR RESPONSE TO NORADRENALINE BY BILE DUCT LIGATION. (Eng.) Bloom, D. S.; Eidelman, B. H.; McCalden, T. A. (Univ. Witwatersrand, Hospital St., Johannesburg, South Africa). *Gut* 16(9):732-737; 1975.

The effect of intracarotid infusions of noradrenalin (8-32 μg/min) on the cerebral blood flow was measured by a ^{133}Xe washout technique in 16 adult baboons including 7 who underwent common bile duct ligation 2 weeks before. In normal baboons, 8 and 16 μg/min caused increased grey matter cerebral blood flow, and at 32 μg/min, the rate was slightly below normal. Blood flow was decreased in jaundiced animals with infusion rates of 8 and 16 μg/min, with a return to normal at 32 μg/min. Grey matter cerebrovascular resistance in normal animals was affected only slightly with noradrenalin infusion rates of 8 and 16 μg/min and was increased slightly at 32 μg/min. In jaundiced animals, the grey matter cerebrovascular resistance was increased significantly at 8 and 16 μg/min. Arterial blood pH, pCO_2, and pO_2 did not change significantly during the experiments. In individual animals, there was no good correlation between the size of the cerebrovascular response to noradrenalin and the degree of jaundice or hepatic dysfunction as monitored by usual serum hepatic chemistries. The plasma renin level was not altered significantly in the jaundiced animals. It is suggested that the increased cerebrovascular sensitivity to noradrenalin in obstructive jaundice following bile duct ligation is the result of disturbed smooth muscle uptake mechanisms allowing a greater concentration of the amine at the receptor sites.

0897 THE PROCESS OF CHOLESTEROL CHOLELITHIASIS INDUCED BY DIET IN THE PRAIRIE DOG: A PHYSICOCHEMICAL CHARACTERIZATION. (Eng.) Holzbach, R. T.; Corbusier, C.; March, M.; Naito, H. K. (Gastrointestinal Res. Unit, Cleveland Clinic Foundation, Cleveland, OH). *J. Lab. Clin. Med.* 87(6):987-998; 1976.

olesterol cholelithiasis was induced in 97 prairie gs to observe the physicochemical changes occurring pidly over a short period of time and to correlate ese with degree of biliary cholesterol saturation. addition, the relation between the *in vivo* events duced in prairie dog bile and recently reported obrvations of cholesterol precipitation phenomena in nthetic bile analogs was investigated. Seventy- dogs were fed a 1.2% cholesterol diet and were crificed at intervals over a 14-day period; the maining 25 were used as controls. In previous udies, solutions of physiologically relevant comsition were constructed, which, when plotted cording to convention on a trilinear graph, fell thin the zone of metastable or suspended supersatution. These solutions revealed a consistent and eviously undescribed liquid crystal to solid crys- l phase transition during their approach to equilibum at 37 C; the present *in vivo* studies of prairie g bile, following rapid induction of supersaturaon; revealed identical changes. At first, the sursaturated biles were isotropic followed by a period turbidity and invariable formation of mesophase. ter a few days, the liquid crystals decreased and lid cholesterol crystallites appeared. This *in vitro* rk has predicted not only static, but dynamic prosses as well, with respect to cholesterol precipition, beginning with the metastably supersaturated ate and eventuating in gallstone formation. Ancilry new findings, resulting from the high cholesrol diet, included the induction of human-like hyperlipoproteinemia and rapid hepatocyte degranulation own by electron microscopy.

98 MICROSOMAL DRUG METABOLISM DURING α-NAPHTHYLISOTHIOCYANATE-INDUCED CHOLESTA- S. (Eng.) Drew, R.; Priestly, B. G. (Dept. man Physiology and Pharmacology, Univ. Adelaide, elaide, South Australia 5001). *Toxicol. Appl. armacol.* 35(3):491-499; 1976.

e time course of changes in microsomal metabolism relation to the time course of cholestasis proced by p.o. administration of a single 200-mg/kg se of α-naphthylisothiocyanate (ANIT) was studied male Wistar rats to determine whether a hypotive, hypertrophic smooth endoplasmic reticulum ER) is a causative factor in producing cholestas. The onset and time course of cholestasis as termined by measurement of bile flow did not ange significantly during the first 12 hr after IT. Complete bile stasis was established by 24 and the bile flow returned to the control value ter 7 days. Hexobarbital sleeping time was pronged 1-7 days after ANIT administration, and *in tro* oxidation of aminopyrine and aniline was imired in 10,000 x *g* supernatants of liver homonates from ANIT-treated rats; impaired oxidation s not demonstrated in 105,000 x *g* microsomes om the same animals. Washout of inhibitory conntrations of ANIT or its metabolites during crosome preparation probably accounted for the screpancy between the two *in vitro* preparations ed to assess SER metabolic activity. After olestasis onset, drug oxidation by 105,000 x *g* crosomes was impaired until normal bile flow s re-established. Decreased microsomal cytochrome P-450 paralleled the changes in (105,000 x *g*) microsomal activity, but at no time was microsomal protein yield per gram of liver significantly altered. The data suggest that precholestatic impairment of microsomal drug metabolism was not associated with a hypertrophic, hypoactive SER. Subsequent reversible SER hypoactivity was the result of bile stasis. Elevation of plasma alanine aminotransaminase provided an early index of ANIT hepatotoxicity, while elevation of plasma bilirubin and 5'-nucleotidase was associated with cholestasis and correlated with the diminution and recovery of bile flow.

0899 SUSCEPTIBILITY OF THE LIVER AND BILIARY TRACT TO ANAEROBIC INFECTION IN EXTRAHEPATIC BILIARY TRACT OBSTRUCTION. II. LIVER FUNCTION AND MORPHOLOGY OF THE LIVER AND BILIARY TRACT--AN EXPERIMENTAL STUDY IN RABBITS. (Eng.) Nielsen, M. L.; Asnaes, S.; Stage, J. G. (31 Sofievej, DK-2900 Hellerup, Denmark). *Scand. J. Gastroenterol.* 11(1): 73-78; 1976.

The histopathological effects and the effects on liver function of anaerobic biliary tract infection, produced by common duct ligation (cdl) 3 days prior to intravenous bacterial inoculation, were studied in rabbits. Animals were investigated 1, 4, or 7 days after inoculation. Histopathological investigations included the liver, the common duct, and the gallbladder, and liver function was evaluated by bilirubin, alkaline phosphatase (AP), and L-alanine aminotransferase (GPT) in serum. Rabbits with cdl and biliary tract infection were compared to rabbits with cdl in which bacterial inoculation failed to produce infection, to inoculated rabbits without cdl, and to uninoculated rabbits with cdl. Anaerobic biliary tract infection in rabbits with cdl caused a significant increase in liver abscesses, a significantly increased infiltration with granulocytes in the gallbladder, and a significant increase in serum levels of bilirubin, AP, and GPT. However, it failed to produce signs of cholangitis in the liver and intramural abscesses in the gallbladder. It is concluded that in this animal model, biliary tract obstruction produces sufficient anaerobic conditions for obligate anaerobic bacteria to multiply in the bile. In addition, the occurrence and significance of anaerobic bacteria in human biliary tract infections must be re-evaluated.

0900 ALCOHOL METABOLISM: MODERN BIOCHEMICAL ASPECTS. (Fre.) Neuzil, E.; Bousquet, F. (Laboratoire Biochimie Medicale, Universite Bourdeaux II, 146, rue Leo-Saignat, Bordeaux-Cedex 33076, France). *Sem. Hop. Paris* 51:29-42; 1975.

0901 CORTICOSTEROID BINDING PROTEINS AND THE HORMONE RECEPTOR IN LIVER. (Eng.) Litwack, G. *In: Advances in Enzyme Regulation. Proceedings of the thirteenth Symposium on Regulation of Enzyme Activity and Synthesis in Normal and Neoplastic Tissues held at Indiana University School of Medicine, Indianapolis, October 7 and 8, 1974.* (Indianapolis, IN): vol. 13, pp. 151-171; 1975.

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0903 METABOLISM OF DIFFERENT HISTONE FRACTIONS UNDER INDUCTION OF RAT LIVER REGENERATION. (Rus.) Rapoport, E. A.; Khasigov, P. Z. (I.M. Sechenov 1st Moscow Medical Inst., Moscow, USSR). *Biokhimiia* 40(3):497-504; 1975.

0904 UNDIFFERENTIATED PATTERNS OF KEY GLYCOLYTIC AND GLUCONEOGENIC ENZYMES IN EPITHELIAL CELL LINES DERIVED FROM RAT LIVER. (Eng.) Taketa, K.; Watanabe, A.; Shimamura, J.; Takesue, A.; Ueda, M. (Okayama Univ. Medical Sch., Okayama, Japan). *Acta Med. Okayama* 29(2):151-159; 1975.

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0906 METABOLISM OF THE BILE LIPIDS. (Ger.) Schentke, K. U.; Renger, F. (Medizinische Akademie, "Carl Gustave Carus," DDR-8019 Dresden Fetscherstrasse 74, Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 34(2/4):99-103; 1974.

0907 EFFECT OF LIPOPROTEIN ON 3-HYDROXY-3-METHYLGLUTARYL COENZYME A (HMG CoA) REDUCTASE ACTIVITY IN RAT LIVER CELL CULTURE: SPECIAL SUPPRESSANT EFFECT OF A LIPOPROTEIN ISOLATED FROM HYPERCHOLESTEROLEMIC RAT PLASMA. (Eng.) Breslow, J. L.; Spaulding, D. R.; Lothrop, D. A.; Clowes, A. W. (Children's Hosp. Medical Center, 300 Longwood Ave., Boston MA 02115). *Biochem. Biophys. Res. Commun.* 67(1):119-125; 1975.

0908 LIPOGENESIS IN MAINTENANCE CULTURES OF RAT HEPATOCYTES. (Eng.) Geelen, M. J. H.; Gibson, D. M. (Lab Veterinary Biochemistry, State Univ. Utrecht, Billstraat 172, Utrecht, Netherlands). *Febs Lett.* 58(1):335-339; 1975.

0909 OXYGEN SUPPLY AND UPTAKE IN THE LIVER AND THE INTESTINE. (Eng.) Lutz, J.; Henrich, H.; Bauereisen, E. (Physiologisches Institut der Universitat Wurzburg, Germany). *Pflugers Arch.* 360(1):7-15; 1975.

0910 UPTAKE AND SUPPLY OF PURINE COMPOUNDS BY THE LIVER. (Eng.) Pritchard, J. B.; O'Connor, N.; Oliver, J. M.; Berlin, R. D. (Harvard Medical Sch., Boston, MA 02115). *Am. J. Physiol.* 229(4):967-972; 1975.

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0912 THE EFFECT ON THE RAT LIVER OF LONG-TERM ADMINISTRATION OF DIFFERENT ALCOHOLIC BEVERAGES TOGETHER WITH INADEQUATE DIETS. (Eng.) Jordo, L.; Olsson, R. (Med. klin, II, Sahlgrenska sjukhuset, Goteborg, Sweden). *Acta Pathol. Microbiol. Scand. [A]* 83(6):717-720; 1975.

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0915 SWELLING AND LOSS OF POTASSIUM IN PERFUSED LIVERS FOLLOWING THE INFLUENCE OF THE VAPORS OF CARBON TETRACHLORIDE, CHLOROFORM, AND HALOTHANE ON THE PERFUSION MEDIUM. (Ger.) Frimmer, M.; Lutz, F. (D-6300 Giessen, Frankfurter Strasse 107, Bundesrepublik Deutschland). *Anaesthesist* 24(3):112-117; 1975.

0916 BIOCHEMICAL ASPECTS OF THE PROTECTIVE ACTION OF PROPYL GALLATE ON LIVER INJURY IN RATS POISONED WITH CARBON TETRACHLORIDE. (Eng.) Torrielli, M. V.; Ugazio, G. (Inst. General Pathology, Univ. Torino, 1-10125, Torino, Italy). *Toxicol. Appl. Pharmacol.* 34(1):151-169; 1975.

0917 ROLE OF CARNITINE IN HEPATIC KETOGENESIS. (Eng.) McGarry, J. D.; Robles-Valdes, C.; Foster, D. W. (Univ. Texas Health Science Center, Dallas, TX 75235). *Proc. Natl. Acad. Sci.* 72(11):4385-4388; 1975.

0918 REPEATED ADMINISTRATION OF CHOLERETICS TO RATS: EFFECTS ON BILE FLOW AND METABOLISM OF BILE SALTS. (Fre.) Grandgeorge, M.; Russier, B.; Duperray, B.; Pacheco, H. (Institut National des Sciences, Appliquees de Lyon, 20, avenue Albert-Einstein, F 69621 Villeurbanne, France). *J. Pharmacol. (Paris)* 5(4):549-566; 1974.

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0921 THE EFFECT OF DIETARY PROTEIN LEVELS ON THE RATE OF LIPID BIOSYNTHESIS FROM GLYCEROL-3-PHOSPHATE IN RAT LIVER. (Eng.) Holub, B. J. (Dept. Nutrition, Univ. Guelph, Guelph, Ontario, NIG 2WI, Canada). *Nutr. Metabol.* 18:70-78; 1975.

0922 BILATERAL ADRENALECTOMY: EFFECT OF A SINGLE TUBE-FEEDING OF TRYPTOPHAN ON AMINO ACID INCORPORATION INTO PLASMA ABUMIN [SIC] AND FIBRINOGEN IN VIVO. (Eng.) Jorgensen, A. J. F.; Majumdar, A. P. N. (Inst. Medical Biochemistry, Univ. Aarhus, DK-8000 Aarhus C, Denmark). *Biochem. Med.* 13(3):231-240; 1975.

0923 EFFECT OF PORTAL ARTERIALIZATION ON HEPATIC CYTOCHROME P-450 IN RATS WITH PORTACAVAL SHUNT. (Eng.) Pector, J. C.; Verbeustel, S.; Lambilliotte, J. P. (Saint-Peter Univ. Hosp., Brussels, Belgium). *Digestion* 12(3):144-151; 1975.

0924 LYSOLECITHINS IN EXPERIMENTAL ACUTE CHOLECYSTITIS. (Fre.) Cardoso, V.; Hipolito-Reis, C.; de Oliveira, C. (Hopital de S. Joao, Porto, Portugal). *Biol. Gastroenterol. (Paris)* 8(1):33-37; 1975.

0925 THE ROLE OF THE LIVER LYMPHATICS IN THE TRANSPORT OF NON-ERYTHROID BILIRUBIN DURING DIFFERENT STAGES OF EXPERIMENTAL CHOLESTASIS. (Eng.) Bergan, A.; Taksdal, S.; Enge, I. (Rikshospitalet, Oslo, Norway). *Scand. J. Gastroenterol.* 10(6):571-576; 1975.

0926 ELIMINATION OF BILIARY ACIDS AND CHOLESTEROL IN THE BILE OF FISTULATED RATS: II. INFLUENCE OF THE HYPOPHYSIS. (Fre.) Cuchet, P. (Universite Scientifique et Medicale, B.P.53, Centre de Tri, 38041, Grenoble, Cedex, France). *J. Physiol. (Paris)* 70(1):85-110; 1975.

0927 CHANGES IN THE TRACE ELEMENT CONTENTS OF RAT LIVER FOLLOWING PARTIAL HEPATECTOMY. (Ger.) Volm, M.; Schuhmacher, J.; Wayss, K.; Wesch, H. (No affiliation given). *Zentralbl. Allg. Pathol.* 119(4):322; 1975.

0928 PHALLOIDIN-INDUCED HYPERPLASIA OF ACTIN FILAMENTS IN RAT HEPATOCYTES. (Eng.) Gabbiani, G.; Montesano, R.; Tuchweber, B.; Salas, M.; Orci, L. (Inst. Histology Embryology, Univ. Geneva, Geneva, Switzerland). *Lab. Invest.* 33(5):562-569; 1975.

0929 IMPORTANCE OF LYMPHATIC DRAINAGE FOR ISCHEMIA OF THE LIVER: I. LYMPH FLOW IN THORACIC DUCT, PROTEIN, AND MINERAL CONCENTRATION IN LYMPH AND PLASMA. (Cze.) Vucinic, M.; Bastos, V.; Vosmik, J.; Pavlik, F. (Oddeieni hrudni a cevni chirurgie, nemonice Dragise Misovice, Belehrad, Jugoslavie). *Rozhl. Chir.* 54(5):311-316; 1975.

0930 THE EFFECTS OF SELECTIVE BILIARY OBSTRUCTION ON BILE SECRETION IN THE RAT. (Fre.) Roze, C.; Souchard, M.; de la Tour, J.; Vaille, C.; Debray, C. (Hopital Bichat, 170, boulevard Ney, F 75877 Paris, Cedex 18, France). *Biol. Gastroenterol. (Paris)* 8(1):21-31; 1975.

0931 CHROMOSOME DAMAGE IN LIVER CELLS FROM LOW DOSE RATE ALPHA, BETA, AND GAMMA IRRADIATION: DERIVATION OF RBE. (Eng.) Brooks, A. L. (Inhalation Toxicology Res. Inst., Lovelace Foundation, Albuquerque, NM 87115). *Science* 190(4219):1090-1092; 1975.

0932 BILE AND STRESS ULCER IN THE RAT. (Ger.) Schumpelick, V. (Chir. Univ.-Klinik, D-2000 Hamburg 20, Martinistr. 52, Hamburg, Germany). *Langenbecks Arch. Chir.* 338(4):265-274; 1975.

0933 GENESIS OF FATTY LIVER AND HYPERLIPEMIA IN THE FETAL GUINEA PIG. (Eng.) Bohmer, T.; Havel, R. J. (Univ. California Sch. Medicine, San Francisco, CA 94143). *J. Lipid Res.* 16(6):454-460; 1975.

0934 PRIMARY LIVER CANCER INDUCED IN RATS BY THE PESTICIDE, 2-CHLOROETHYL 1-METHYL-2-(p-tert.-BUTYLPHENOXY)ETHYL SULFITE (ARAMITE). (Fre.) Truhaut, R. Claude, J.-R.; Vu Ngoc-Huyen; Warnet, J. -M.; Blanc, F. (Faculte des Sciences Pharmaceutiques et Biologiques, Universite Rene-Descartes, Paris-V, 4, avenue de l'Observatoire, 75006 Paris, France). *C. R. Acad. Sci.* [*D*] *(Paris)* 281(9):599-604; 1975.

See also, 0780, 0842, 1303, 1384.

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Intestine

0935 IMMUNOHISTOCHEMICAL IDENTIFICATION OF THE CHOLECYSTOKININ CELL IN THE INTESTINAL MUCOSA. (Eng.) Buffa, R.; Solcia, E.; Go, V. L. W. (Histopathology, Histochemistry, Ultrastructure Center, Univ. Pavia, Varese, Italy). *Gastroenterology* 70(4):528-532; 1976.

Antibodies against pure porcine cholecystokinin (CCK) obtained from the rabbit were used to selectively stain specific CCK cells in the duodenal and jejunal mucosa of the dog and man. The CCK cells were scattered in the epithelium of the crypts, although some were in the villi. No CCK cells were found in the stomach, pancreas, terminal ileum, or colon. Some pyloric G cells also showed some reactivity with CCK antiserum, but absorption of CCK antiserum with gastrin C terminal pentapeptide prevented the staining of pyloric cells and provided specific staining of intestinal CCK cells. Antihuman gastrin I serum also stained some intestinal cells. Most of these cells did not react when gastrin antiserum was absorbed with pure CCK (a treatment that did not prevent the staining of pyloric gastrin cells). The authors suggest that most gastrin-immunoreactive cells of the intestinal mucosa should be interpreted as cross-reacting CCK cells rather than intestinal gastrin cells.

0936 DIFFERENTIAL REGENERATION OF INTESTINAL PROLIFERATIVE CELLS AND CRYPTOGENIC CELLS AFTER IRRADIATION. (Eng.) Potten, C. S.; Hendry, J. H. (Paterson Lab., Christie Hosp., Manchester M20 9BX, U.K.). *Int. J. Radiat. Biol.* 27(5):413-424; 1975.

The sizes and regeneration kinetics of the total proliferative and cryptogenic populations in mouse jejunum after irradiation are defined. A dose of 900 rad γ-rays to female BD2F$_1$ (Pat) and DBA/2 mice reduced the number of cryptogenic cells (those capable of crypt regeneration) per small intestinal crypt from about 80 to about 2 per surviving crypt. The surviving cells repopulated the crypt, the estimated cell number doubling-time being about 24 hr. On the fourth day after irradiation their numbers were still slightly below normal. The regeneration patterns for cryptogenic and proliferative cells differed significantly over the first 4 days after irradiation. The numbers of proliferative cells fell initially and remained low, while the cryptogenic cells were increasing in number. The low levels persisted for the first 1.5-2 days, after which there was a rapid rise in proliferative cells per crypt with a significant overshoot on the third day and a peak on the fourth day. The number of proliferative cells per crypt in control animals was about twice the number of cryptogenic cells. This ratio was 12 on average after irradiation (days 1-4). These data add support to the hypothesis that the small intestinal crypts contain a subpopulation of stem cells distinct from the proliferative cells.

0937 FATE OF SOLUBLE CARBOHYDRATE IN THE COLON OF RATS AND MAN. (Eng.) Bond, J. H., Jr.; Levitt, M. D. (Veterans Admin. Hosp., Minneapolis, MN 55417). *J. Clin. Invest.* 57(5):1158-1164; 1976.

The fate of glucose in the colon of Sprague-Dawley rats and four healthy men was investigated by measuring breath $^{14}CO_2$ and fecal ^{14}C after direct instillation of ^{14}C-labeled glucose, acetate, and lactate into the cecum. For the 6 hr after administration of up to 400 mg of [U-^{14}C]glucose to the rat and 12.5 g to man, $^{14}CO_2$ excretion was as rapid after intracecal as after intragastric instillation. Less than 20% of ^{14}C, instilled into the cecum as glucose, was recovered in feces, and only about 15% of this fecal ^{14}C was in a dialyzable form. The conversion of intracecally administered glucose to CO_2 was dependent upon the presence of the colonic flora, as evidenced by the minimal excretion of $^{14}CO_2$ after administration of [^{14}C]glucose (200 mg) to germ-free rats. In contrast, acetate and lactate were converted to CO_2 as rapidly in germ-free rats as in their conventional counterparts. Measurement of O_2 availability in the colonic lumen indicated that insufficient O_2 was available for the aerobic metabolism of glucose by the colonic bacteria. These experiments suggest that the colon bacteria anaerobically metabolize most of the glucose to short-chain fatty acids, which are absorbed and oxidized by the host. Most of the remaining fecal glucose is converted to a larger molecular form that has limited osmotic activity. Thus, the colonic flora benefits the host by reducing the osmotic load of nonabsorbed carbohydrate and by making possible the salvage of a large percentage of the calories of carbohydrate, which is not absorbed in the small bowel.

0938 TOPOGRAPHICAL RELATIONSHIP BETWEEN SUCRASE AND LEUCINE β-NAPHTHYLAMIDASE ON THE MICROVILLI MEMBRANE OF RABBIT INTESTINAL MUCOSAL CELLS. (Eng.) Takesue, Y.; Nishi, Y. (Res. Inst. Environmental Medicine, Nagoya Univ., Nagoya, Aichi 464, Japan). *J. Biochem. (Tokyo)* 79(3):479-488; 1976.

The arrangement of the hydrolases on the microvilli membrane of rabbit small intestinal mucosal cells was investigated using antibodies to two hydrolases with different antigenicities, sucrase and β-naphthylaminidase (LNAase). Like anti-sucrase antibody, anti-LNAase antibody quantitatively agglutinated microvilli vesicles. It inhibited the membrane-bound LNAase activity in the same manner as the detergent-solubilized activity. This inhibitory effect of anti-LNAase antibody was not interfered with by monovalent fragments of anti-sucrase antibody. However, the monovalent fragments inhibited vesicle agglutination by anti-LNAase antibody as well as by anti-sucrase antibody. These results indicate that LNAase is located on

he outer surface of microvilli vesicles and suggest
hat LNAase and sucrase are situated in close
roximity on the membrane surface of microvilli
esicles.

939 INTRACOLONIC TENSIONS OF OXYGEN AND CARBON
DIOXIDE IN GERMFREE, CONVENTIONAL, AND
NOTOBIOTIC RATS. (Eng.) Bornside, G. H.; Donovan,
. E.; Myers, M. B. (Louisiana State Univ. Medical
enter, New Orleans, LA 70112). *Proc. Soc. Exp. Biol.*
ed. 151(2):437-441; 1976.

he relation of intracolonic gaseous tension to fecal
icroflora was investigated by mass spectrometric
easurements of intracolonic O_2 and CO_2 in unanes-
hetized germfree, conventional, and gnotobiotic
ischer 344 CDF rats. I.p. measurements were obtained
a rats whose colons became perforated accidentally
12% of the restrained rats) and mean intracolonic
aseous tensions were measured at 5-min intervals.
ecal bacterial flora and cecal size were also deter-
ined. Gnotobiotes were monoassociated with *Escher-*
chia coli, Bacteroides fragilis and *Staphylococcus*
pidermidis, and were diassociated with *E. coli* plus
. fragilis and with *Bacillus macerans* plus an aero-
ic diphtheroid. Mean intracolonic pO_2 in conven-
ional rats (11.1 mm Hg) was significantly lower than
a germfree rats (12.8 mm Hg); mean intracolonic pCO_2
a conventionals (83.4 mm Hg) was greater than in germ-
ree rats (54.6 mm Hg). Differences of pO_2 values
mong all rats were slight. However, intracolonic
CO_2 values were directly related to CO_2 production
 the normal intestinal flora, and were thus sig-
ificantly lower in both germfree and gnotobiotic
ats. I.p. tensions were independent of the status
 rats, and the mean i.p. pO_2 and pCO_2 (38.9 and
.1 mm Hg, resp.) agreed with previously reported
alues. The enlarged cecum, characteristic of germ-
ree rats, was also present in gnotobiotic rats.
ounts of each bacterial species in feces of mono-
ssociated rats were 10^8-10^{10}/g; counts were pro-
ressively smaller in feces of diassociated rats and
onventional rats (10^8-10^9/g and 10^5-10^8/g, resp).
ntracolonic gaseous tensions of CO_2 clearly reflected
e presence of a normal flora in conventional rats
d were inversely proportional to cecal size.

40 PLASMA SECRETIN AND GASTRIN RESPONSES TO
A MEAT MEAL AND DUODENAL ACIDIFICATION
 DOGS. (Eng.) Lee, K. Y.; Tai, H. H.; Chey,
 Y. (Univ. Rochester Sch. Medicine and Dentistry,
chester, NY 14607). *Am. J. Physiol.* 230(3):784-
9; 1976.

 five conscious dogs with gastric fistula and two
odenal cannulas, plasma radioimmunoassay (RIA)
cretin and gastrin levels were determined in
sponse to infusion of 0.1 N HCl in the proximal
odenal cannula, ingestion of a meal, and intra-
odenal infusion of 0.1 N HCl following ingestion
 a meal. Significant increases in plasma RIA
cretin levels occurred during duodenal acidifica-
on. However, no significant change occurred in
e secretin levels after ingestion of a meal,
ereas significant increase in plasma gastrin
vel was observed. Postprandial duodenal pH
remained above 4.5 for 3 hr. In three additional dogs with pancreatic cannula, pancreatic secretion of bicarbonate increased markedly following ingestion of a meal, although the duodenal pH remained above 4.5 and plasma RIA secretin did not change significantly. In the experiments with ingestion of a meal, duodenal infusion of 0.1 N HCl caused significant increases in the secretin levels, but the gastrin levels decreased as the duodenum was acidified. These results indicate that endogenous release of secretin depends on acid pH of the duodenal contents in dogs, but no significant change occurs in the plasma RIA secretin levels after a meal. The increase in the secretin levels and significant decrease in the gastrin levels following duodenal acidification during the postprandial period suggests that increased release of secretin might inhibit endogenous release of gastrin.

0941 STORAGE AND RELEASE OF LABELLED ACETYLCHOLINE IN THE MYENTERIC PLEXUS OF THE GUINEA-PIG ILEUM. (Eng.) Szerb, J. C. (Dept. Physiology and Biophysics, Dalhousie Univ., Halifax, Nova Scotia B3H 4H7, Canada). *Can. J. Physiol. Pharmacol.* 54(1):12-22; 1976.

The existence of the selective activation of two populations of cholinergic neurons in the myenteric plexus of guinea pig ileum was investigated. Guinea-pig ileum myenteric plexus, a longitudinal muscle preparation, was superfused with [^{3}H]choline for 15 min either without being stimulated or during field stimulation at 0.1 or 16 Hz; the preparation was then either removed immediately or after 75- or 135-min superfusion with hemicholinium-3 (HC-3), and the total acetylcholine (ACh) and [^{3}H]ACh contents were determined. The preparation was stimulated for 60 min the second time at 0.1 or 16 Hz in the presence of hemicholinium for the measurement of [^{3}H]ACh release. Exposure to [^{3}H]-choline without stimulation resulted in the formation of [^{3}H]ACh, which decreased without further stimulation in the presence of HC-3 at the same rate as did total ACh. Labeling during 0.1-Hz stimulation resulted in [^{3}H]ACh stores that were maintained in the first 75 min but decreased thereafter. Labeling during stimulation of 16 Hz produced the largest and best maintained [^{3}H]ACh content. Following labeling during 0.1-Hz stimulation, more label could be released than following labeling in the absence of stimulation. Labeling during 16-Hz stimulation did not increase any further the pool of [^{3}H]ACh accessible to release by 0.1-Hz stimulation, but caused a 2.5-times increase in the pool from which 16 Hz stimulation released [^{3}H]ACh. These results suggest that two populations of cholinergic neurons exist in the myenteric plexus, one activated only by high frequency stimulation, the other by both high and low frequency stimulation.

0942 EFFECTS OF CALCIUM ON INTESTINAL MUCIN: IMPLICATIONS FOR CYSTIC FIBROSIS. (Eng.) Forstner, J. F.; Forstner, G. G. (Hosp. Sick Children, Toronto, Ontario, Canada). *Pediatr. Res.* 10(6):609-613; 1976.

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Using purified rat intestinal goblet cell mucin as a model mucin, the effect of $CaCl_2$ (1-25 mM) on the physical properties of the mucin were investigated. Isotonicity of incubation media was preserved to mimic *in vivo* conditions. $CaCl_2$ (8-15 mM) caused a 15-33% decrease in viscosity, no change in electrophoretic mobility in acrylamide gels, and a 20-30% decrease in solubility of the mucin. Solubility changes were reversed by the addition of 20 mM EDTA to incubations. Insolubility was also produced in incubations of mucin with a mixture of soluble intestinal contents (NaCl washings). These findings strongly suggest that the mucin became smaller and more dense as calcium was added, a process most probably achieved by loss of intramolecular water.

0943 INTESTINAL LIPOPROTEIN FORMATION: EFFECT OF CHOLCHICINE.

(Eng.) Glickman, R. M.; Perrotto, J. L.; Kirsch, K. (Beth Israel Hosp. and Harvard Medical Sch., Boston, MA 02215). *Gastroenterology* 70(3):347-352; 1976.

Possible microtubule involvement in intestinal lipoprotein formation or secretion was studied by determining the effect of colchicine on intestinal lipid absorption in rats. The effect of colchicine (0.5 mg/100 g) in the lymphatic absorption of $[^{14}C]$-oleic acid was studied in male Holtzman rats with indwelling mesenteric lymph cannulas. Colchicine-treated animals showed a marked delay and a decrease in the lymphatic absorption of $[^{14}C]$oleic acid. Chylomicrons from colchicine-treated animals showed no difference in apoprotein content when examined on sodium dodecyl sulfate polyacrylamide gels. Micellar lipid absorption studied from *in situ* jejunal loops in animals pretreated with colchicine revealed that colchicine administration was associated with a threefold increase in residual mucosal lipid when compared with controls. Thin layer chromatography of residual lipid showed that residual lipid was largely present as triglyceride, suggesting that the impairment in lipid transport induced by colchicine was at a site distal to triglyceride resynthesis. Electron microscopy of intestine from colchicine-treated animals revealed that most residual lipid was present within the endoplasmic reticulum and Golgi in numerous particles the size of chylomicrons (0.2-0.4 μ). These results suggest that the impairment in lipid transport induced by colchicine is distal and, in part, may represent an "exit block." The results also suggest a possible role for microtubules in intestinal lipid transport.

0944 THE INFLUENCE OF HYDROCORTISONE ON THE SYNTHESIS AND TURNOVER OF MICROVILLOUS MEMBRANE GLYCOPROTEINS IN SUCKLING RAT INTESTINE.

(Eng.) Forstner, G.; Galand, G. (Hosp. Sick Children, Toronto, Ontario M5G 1X8, Canada). *Can. J. Biochem.* 54(3):224-232; 1976.

Synthesis and degradation of intestinal mucosal and microvillous membrane glycoproteins were studied in control Wistar suckling rats and suckling rats given cortisol acetate by i.p. injection for 3 days (5.0, 2.5, and 2.5 mg/100 g on postnatal days 10, 11, and 12, resp.). Cortisol acetate had no effect on total uptake of radioactive glucosamine by the protein free compartment of rat intestine. Early incorporation of $[1\text{-}^{14}C]$glucosamine by intestinal glycoproteins was enhanced by cortisol, but stimulation was the same in membrane and homogenate fractions. Polyacrylamide gel electrophoresis of membrane proteins solubilized with 2% sodium dodecyl sulphate demonstrated a cortisol-dependent change, characterized by loss of faster traveling glycoproteins, and a corresponding shift in maximum labeling at 3 hr from these glycoproteins to more slowly migrating glycoproteins. Degradation was studied qualitatively with a double isotope technique. Glycoprotein degradative rates appeared to be stimulated by cortisol, but similarly in membrane and total homogenate fractions. On polyacrylamide gels, the areas occupied by glycoproteins with the highest apparent degradative rates corresponded closely with the areas of most active labeling at 3 hr. The rate of degradation in the most actively labeled zone appeared to be higher after cortisol than in the controls. The results indicate that cortisol does not alter membrane composition by inhibiting degradation of selected glycoproteins, and are consistent with a model in which cortisol stimulates the synthesis of specific membrane glycoproteins in suckling rats, while inhibiting synthesis of other glycoproteins.

0945 EFFECT OF SHIGELLA ENTEROTOXIN ON ELECTROLYTE TRANSPORT IN RABBIT ILEUM.

(Eng.) Donowitz, M.; Keusch, G. T.; Binder, H. J. (Dept. Internal Medicine, Yale Univ., New Haven, CT 06510). *Gastroenterology* 69(6):1230-1237; 1975.

The effect of *Shigella dysenteriae I* enterotoxin on electrolyte transport in rabbit ileal loops was investigated *in vivo* in New Zealand white male rabbits. The findings were compared with those observed in previous studies of ileal mucosa exposed to choleragen. Twenty-eight of 31 loops incubated with shigella enterotoxin in 17 animals were positive, and the mean fluid secreted in the positive loops was 0.65 ± 0.04 ml/cm. The ionic composition was similar to that produced by cholera and *Escherichia coli* enterotoxins. Fluid and electrolyte accumulation occurred *in vivo* and net sodium secretion (-1.0 ± 0.6 $\mu Eq/hr/cm^2$) was present *in vitro* in the enterotoxin exposed tissue in contrast to net sodium absorption in control mucosa. Short circuit current (IsC) was similar in control and toxic tissues. The IsC increased following addition of either 10 mM theophylline, or 0.5 mM dibutyryl cyclic AMP and was similar in enterotoxin exposed and control mucosa. Glucose (10 mM) resulted in a smaller increment of IsC in treated tissue. Mucosal cyclic AMP levels in enterotoxin-exposed mucosa did not differ from those of control. These results demonstrate a difference between the characteristics of rabbit ileal mucosa exposed to shigella or cholera enterotoxin, although both produce electrolyte secretion *in vivo* and *in vitro*. In addition, these studies suggest that cyclic AMP may not mediate the shigella enterotoxin stimulation of intestinal luid and electrolyte secretion as is observed ith cholera enterotoxin-induced intestinal secreion.

946 SHORT CHAIN FATTY ACIDS IN RATS WITH JEJUNAL BLIND LOOPS: I. ANALYSIS OF SCFA N SMALL INTESTINE, CECUM, FECES, AND PLASMA. (Eng.) rizont, R.; Whitehead, J. S.; Kim, Y. S. (Veterans dmin. Hosp., San Francisco, CA 94121). *Gastronterology* 69(6):1254-1264; 1975.

he luminal and plasma levels of short chain fatty cids (SCFA), products of bacterial fermentation, ere measured in male Wistar rats with surgically roduced, self-filling blind loops located in the roximal small intestine. The SCFA content in the mall intestine, plasma, and feces were measured by as chromatography. Acetic, propionic, and butyric cids constituted 95% of SCFA in blind loop segments. or the normal cecum, the isobutyic, isovaleric, and aleric acids constituted 8% of the total fatty cids. Feeding or fasting made little difference. n rats treated with 1 g lincomycin, SCFA were not etected in the blind loop contents, except in one at which had 272 μg of acetic acid. Plasma SCFA onsisted mainly of acetic acid (137 ± 32 μg/ml); he rest were isovaleric (5.2 ± 2.6 μg/ml) and isoutyric (1.4 ± 0.7 μg/ml) acids. Blind loop animals ad nearly twice the concentration of acetic acid in he plasma (240 ± 29 μg/ml) as normal animals. This uggests that endogenous substances may be important ubstrates for the production of SCFA in the inestinal lumen. The high levels of SCFA in the mall intestine and in the feces and the subtantial increase in the concentration of acetic cid in the plasma may aid in the diagnosis of acterial overgrowth syndrome if the same relations re found in man.

947 GASTROINTESTINAL GAS PRODUCTION IN RATS FED ON DIETS CONTAINING GERMINATED EGUMES. (Eng.) Venkataraman, L. V.; Jaya, T. V. Central Food Technological Res. Inst., Mysore, dia). *Nutr. Rep. Int.* 12(6):387-398; 1975.

0948 ENZYMES OF GLYCEROLIPID SYNTHESIS IN SMALL-INTESTINAL MUCOSA OF FOETAL AND NEONATAL GUINEA PIGS. (Eng.) Short, V. J.; Dils, R.; Brindley, D. N. (Dept. Biochemistry, Univ. Nottingham, Nottingham NG7 2UH, U.K.). *Biochem. J.* 152(3):675-679; 1975.

0949 DEVELOPMENTAL ASPECTS OF GALACTOSE-1-PHOSPHATE URIDYLYLTRANSFERASE IN RAT INTESTINE. (Eng.) Koo, C.; Rogers, S.; Segal, S. (Children's Hosp., Philadelphia, PA 19146). *Biol. Neonate.* 27(314):153-162; 1975.

0950 RADIATION EFFECTS ON ALKALINE PHOSPHATASE AND GLUCOSE-6-PHOSPHATASE IN ANATOMICALLY DIFFERENT REGIONS OF MOUSE INTESTINE. (Eng.) Kaur, A.; Dubey, D. P.; Gupta, G. S. (Dept. Biophysics, Panjab Univ., Chandigarh-160-014, India). *Strahlentherapie* 150(4):427-432; 1975.

0951 DAMAGE AND RECOVERY ASSESSMENT OF THE MOUSE JEJUNUM TO ABDOMINAL X-RAY AND ADRIAMYCIN TREATMENT. (Eng.) Burholt, D. R.; Hagemann, R. F.; Cooper, J. W.; Schenken, L. L.; Lesher, S. (Alleghany General Hosp., 320 East North Ave., Pittsburgh, PA 15212). *Br. J. Radiol.* 48(575):908-912; 1975.

0952 TOTAL TRANSPLANTATION OF THE SMALL INTESTINE IN THE DOG. II. TWO COMPARATIVE SERIES OF ORTHOTOPIC AUTOGRAFTS AND ALLOGRAFTS. (Fre.) Vignal, J.; Tissot, E.; Moulay, A.; Papathanassiou, Z.; Faure, J. L. (Hopital Ed.-Herriot, 69374 Lyon Cedex 2, France). *Lyon Chir.* 70(5):310-312; 1974.

See also, 0779, 0787, 0789, 0791, 0798, 0909, 0959, 1392.

GENERAL

53 IS THERE AN ANTRAL-BODY PORTAL SYSTEM IN THE STOMACH? (Eng.) Taylor, T. V.; Torrance, (Manchester Royal Infirmary, Manchester, England). t 16(10):781-784; 1975.

e direction of blood flow from the gastric mucosa s studied in the Wistar rat, with particular atten-on to the relationship between the antrum and the rietal cell mass. A group of rats was given a ngitudinal gastrotomy close to the greater curvature d an intramucosal injection of $Rb^{86}Cl$ was made in e antrum away from the antral-body junction; the ts were killed after 60 sec. In a second group, all ood vessels supplying and draining the stomach were cluded by clamps, but the other procedures remained the same. In a third group, the stomach was divided at the antral-body junction and none of the major feeding vessels along the curvature was interrupted. In a fourth group, the isotope was injected into the mucosa of the stomach body after a longitudinal gastrotomy near the greater curvature. In each case, radioactivity was measured in the liver and in the stomach body. In a fifth group, treated identically to the first group, the duodenum and a strip of terminal ileum were analyzed instead of the liver. In the first group, the radioactivity was transferred from the antrum to the body of the stomach, presumably without passing through the general circulation. Activity in the liver, transmitted by the blood either from the antrum or body of the stomach, was detected.

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In the second group, virtually no activity was detected in the body of the stomach, suggesting that the transfer from antrum to body is dependent upon mucosal blood flow. In the third group, after antral exclusion, no activity was transferred to the stomach body, but liver activity was similar to that in the first group. In the fourth group, only a small amount of activity was detected in the antrum. In the fifth group, a small amount of activity occurred in the duodenum, but none occurred in the terminal ileum. The results suggest that a "portal system" exists between the antrum and body of the rat stomach.

0954 FUNCTION OF THE DUCT-LIGATED CANINE PANCREATIC ALLOGRAFT.

(Eng.) Brynger, H.; Bergmark, J.; Claes, G. (Sahlgrenska sjukhuset, Univ. Goteborg, Goteborg, Sweden). *Eur. Surg. Res.* 7(4/5):212-229; 1975.

Heterotropic transplantation of a duct-ligated canine pancreas was performed in 20 previously pancreatectomized, nonrelated recipient mongrel dogs to assess the endocrine function of the gland in the early post-transplantation period. Glucose levels of the 15 dogs surviving after transplantation followed a uniform course. Before pancreatectomy the mean level was 84 mg/100 ml; after transplantation, the blood glucose values normalized within 24 hr. Insulin levels before pancreatectomy were 10 mU/l; after pancreatectomy, the levels decreased significantly to 5 ± 1 mU/l. Initial amylase values showed a mean of 1,520 U/l; after pancreatectomy, the values decreased to 612 U/l. Early endocrine capacity of the transplanted duct-ligated pancreas was satisfactory, restoring the blood glucose in the pancreatectomized recipients to normal levels.

0955 ILEAL CRYPT CELL POPULATION KINETICS AFTER 40% SMALL BOWEL RESECTION: AUTORADIOGRAPHIC STUDIES IN THE RAT.

(Eng.) McDermott, F. T.; Roudnew, B. (Alfred Hosp., Prahran, 3181, Victoria, Australia). *Gastroenterology* 70(5): 707-711; 1976.

Ileal crypt cell population kinetics were investigated by autoradiography with ^{3}H-thymidine in male Sprague-Dawley rats 60 days after resection of a jejunal segment equivalent to 40% of the length of the small bowel. Controls were subjected to transection and anastomosis. The mean total number of cells and the mean number of labeled cells per crypt cell column were estimated. The distribution of proliferating cells was obtained by determining the percentage of labeled cells at each cell position in the crypt cell columns. The cell cycle was analyzed by the method of percentage-labeled metaphases. The mean total number of cells was increased from 30.5 to 36.6 and the mean number of labeled cells per crypt cell column was increased from 10.2 to 12.4. The labeling index was unaltered. The mean sizes of the proliferative and maturation zones were increased. The estimated median duration of the cell cycle was 11.5 hr in the control group and 10.5 hr in the resection group. The duration of DNA synthesis was 6.4 hr in both groups. It is concluded that 40% small bowel resection increases cell renewal by expanding the size of the proliferative zone of the crypt cell population.

0956 INTERSTITIAL FLUID PRESSURE IN CANINE GASTRIC MUCOSA.

(Eng.) Altamirano, M.; Requena, M.; Perez, T. C. (Escuela de Medicina J. M. Vargas, Universidad Central de Venezuela, Caracas, Venezuela). *Am. J. Physiol.* 229(5):1414-1420; 1975.

The interstitial fluid pressure in canine gastric mucosa was measured in mongrel dogs to evaluate the performance of Guyton's small plastic capsules implanted in the submucosa of the gastric corpus. The pressure of the fluid inside the capsule (ICP) was measured between 12-42 days later after mounting the piece of the corpus in a Plexiglas chamber. The capsule was always filled with saline. In two of three experiments, the ICP did not change significantly when the saline was replaced by isotonic glucose or blood plasma. Changes of pressure exerted on the surface of the stomach were accurately monitored by the ICP recordings. Changes of circulation produced by compression of the artery or the vein connected to the piece of mucosa, or by intra-arterial injection of 5 µg epinephrine, 5 µg norepinephrine, 5 µg isoproterenol, or 18% hypertonic mannitol modified the ICP as predicted by Starling's law of capillary filtration. Spontaneous activity of the gastric muscles or the activity, that followed intra-arterial injections of 5-10 µg acetylcholine, 50 µg prostigmine, or large doses of histamine changed the ICP significantly. Intra-arterial atropine usually decreased the ICP by 3-5 mm Hg. The mean value of the ICP in 49 animals was 0.53 ± 0.34 mm Hg; it was negative in 43% of the experiments. It is concluded that the ICP is an accurate estimate of the interstitial fluid pressure of the gastric submucosa.

0957 THE EFFECTS OF CHOLERA ENTEROTOXIN ON INTESTINAL TISSUE WATER AS MEASURED BY NUCLEAR MAGNETIC RESONANCE (NMR) SPECTROSCOPY.

(Eng.) Udall, J. N.; Alvarez, L. A.; Nichols, B. L.; Hazlewood, C. F. (Baylor Coll. Medicine, Houston, TX 77025). *Physiol. Chem. Phys.* 7(6): 533-540; 1975.

The theory that cholera enterotoxin alters the permeability of rat intestinal cells to water was tested by nuclear magnetic resonance (NMR) spectroscopy. Small intestinal loops of male Texas inbred rats were injected with 0.5 ml of either Schwarz/Mann cholera entertoxin (40 µg/cm^3 saline solution) or normal saline. Full thickness segments of intestine from each loop were taken and percentage of water (using a gravimetric procedure that included a correction for fat) and NMR relaxation times were determined. The mean value for tissue water was 79.49% in the controls and 84.52% in the cholera specimens ($p<0.001$). T_1 (spin-lattice) relaxation times were 521.22 ± 69.5 msec in the controls and 667.96 ± 119.25 msec in cholera tissue ($p<0.001$). T_2 (spin-spin) relaxation times were 62.34 ± 9.59 msec in controls and 80.35 ± 21.46 msec in cholera tissue ($p<0.02$). These findings are consistent

h the theory that cholera enterotoxin causes
reased secretion into the lumen of the rat
estine, which is associated with an increase in
sue water.

58 THE EFFECT OF GLUCAGON ON TOTAL LIVER BLOOD
FLOW AFTER OCCLUSION OF THE HEPATIC ARTERY:
TUDY IN ANESTHETIZED, NORMOTENSIVE DOGS. (Eng.)
le, N.; Lim, R. C.; Lindberg, B. (San Francisco
eral Hosp., San Francisco, CA 94110). *Acta Chir.*
nd. 142(1):43-46; 1976.

effect of glucagon in normotensive dogs was
died after occlusion of the hepatic artery. Glu-
on (50 μg/kg, i.v.) significantly increased total
er blood flow 67% in all of six dogs compared to
increase of 3% in four controls. The authors
gest that in man, glucagon treatment may be bene-
ial when occlusion of the hepatic artery becomes
essary during surgery.

9 INCREASED INTESTINAL MUCOSAL TURNOVER AND
RADIOSENSITIVITY TO SUPRALETHAL WHOLE-BODY
ADIATION RESULTING FROM CHOLIC ACID-INDUCED ALTERA-
NS OF THE INTESTINAL MICROECOLOGY OF GERMFREE CFW
E. (Eng.) Mastromarino, A. J.; Wilson, R. (M.D.
erson Hosp., Tumor Inst., 6723 Bertner Ave., Pru-
tial 1801, Houston, TX 77030). *Radiat. Res.* 66
:393-400; 1976.

effect of cholic acid fed to germfree CFW mice on
turnover time of intestinal mucosal cells and on
radiosensitivity to 1,000-10,000 rad whole-body
adiation was investigated. Twenty-eight germfree
25 conventionalized mice received a diet supple-
ted with 0.15% cholic acid for 2 weeks. Six con-
tionalized and eight germfree mice were injected
. with 30 μCi thymidine. In germfree mice on cho-
acid supplementation, the turnover of thymidine-
eled intestinal mucosal cells was significantly
reased and the radiosensitivity to supralethal
le-body irradiation was significantly increased com-
ed to germfree controls. There was a positive cor-
ation between increased survival time after supra-
hal whole-body irradiation and slower intestinal
osal turnover time. Germfree mice supplemented
h cholic acid had intestinal mucosal turnover
es comparable to those of conventionalized controls.
hough cholic acid reduced the mean survival time
germfree mice after supralethal whole-body irradi-
on, the mean survival value was significantly greater than for the conventionalized controls. Supplementing the diet of 26 conventionalized CFW mice with cholic acid did not significantly decrease the intestinal mucosal turnover time nor did it significantly alter their radiosensitivity to supralethal whole-body irradiation. These data suggest that cholic acid is one of the microecological factors responsible for controlling the mucosal renewal rate and the mean survival time after whole-body irradiation.

0960 LYSOSOMAL DYSFUNCTION IN COLONIC SUBMUCOSAL MACROPHAGES OF RHESUS MONKEYS CAUSED BY DEGRADED IOTA CARRAGEENAN. (Eng.) Mankes, R.; Abraham, R. (Albany Medical Coll., Albany, NY 12208). *Proc. Soc. Exp. Biol. Med.* 150(1):166-170; 1975.

0961 INTESTINAL pH AND PROPULSION: AN EXPLANATION OF DIARRHOEA IN LACTASE DEFICIENCY AND LAXATION BY LACTULOSE. (Eng.) Bennett, A.; Eley, K. G. (King's Coll. Hosp. Medical Sch., London, SE5 8RX, U.K.). *J. Pharm. Pharmacol.* 28(3):192-195; 1976.

0962 NONPATHOGENICITY OF ANTIINTESTINAL ANTIBODY IN THE RABBIT. (Eng.) Rabin, B. S.; Rogers, S. J. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Am. J. Pathol.* 83(2):269-282; 1976.

0963 EXPERIMENTAL PANCREAS TRANSPLANTATION. (Eng.) Bornemisza, G.; Furka, I.; Gyurko, G.; Szentkereszty, B.; Miko, I. (Univ. Medical Sch., H-4012 Debrecen-12, Hungary). *Acta Chir. Acad. Sci. Hung.* 15(4):343-352; 1974.

0964 EFFECTS OF PROLONGED HYPERCHOLESTEROLEMIA IN THE MOUSE. (Eng.) Loria, R. M.; Kibrick, S.; Downing, D.; Madge, G.; Fillios, L. C. (Dept. Microbiology, Virginia Commonwealth Univ., VA). *Nutr. Rep. Int.* 13(5):509-518; 1976.

See also, 0856, 0893.

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DIAGNOSTIC PROCEDURES

0965 PRISCOLINE-AUGMENTED HEPATIC ANGIOGRAPHY. (Eng.) Goldstein, H. M.; Thaggard, A.; Wallace, S.; Neiman, H. L. (M.D. Anderson Hosp. Tumor Inst., Houston, TX 77025). *Radiology* 119:275-279; 1976.

Experience with tolazoline hydrochloride (Priscoline) during liver angiography in 26 studies of 25 patients is presented. Two patients were studied for hepatic cysts, and the others had known or suspected metastases from various primary sites. A control angiogram was obtained routinely without a pharmacologic agent. The Priscoline dose was 25-35 mg, injected over a period of 10-15 sec, 30-45 sec prior to the injection of contrast material. Priscoline was of diagnostic value in 8 of the 26 studies. In six cases, the major advantage was increased diagnostic confidence because of significantly improved demonstration of metastases or cyst wall. In several cases, this improvement was manifested as increased hypervascularity and staining of the metastatic nodules, while in several others there was production or accentuation of a hypervascular rim effect about the metastatic lesions. In two cases, Priscoline made the angiographic diagnosis more difficult; a carvernous hemangioma was less opacified, and multiple colonic metastases were less hypervascular. No significant side effects were noted. Priscoline is a useful adjunct to hepatic angiography in the evaluation of space-occupying lesions. Combinations of pharmacoangiography, infusion techniques, and angiotomography may provide the best angiographic accuracy in both the evaluation and staging of hepatic mass lesions.

0966 HEPATIC ANGIOGRAPHY IN ULCERATIVE COLITIS AND CROHN'S DISEASE. (Eng.) Ekelund, L.; Lunderquist, A.; Dencker, H.; Akerman, M. (Dept. Diagnostic Radiology, Univ. Lund, Lund, Sweden). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 126(5):952-956; 1976.

Liver angiography was performed in 13 patients with Crohn's disease and in 3 with ulcerative colitis. Of these patients, 13 underwent liver biopsy (large needle histological biopsy or fine needle aspiration biopsy for cytologic analysis), and the findings were correlated with the results of angiography and biochemical tests. Twelve liver biopsies were abnormal, primarily showing fatty infiltration and reactive hepatitis. Thirteen angiographies were abnormal, with widened and tortuous liver arteries being the most common finding. Liver function tests were within normal limits for all but 3 of the 16 patients, thus correlating poorly with findings of the other tests. Nonhomogeneous hepatograms, observed in seven patients, may indicate a scattered distribution of liver changes and explain why liver biopsy can fail to demonstrate abnormality. These data show that angiography is useful in detecting hepatic abnormality, but evaluation with liver biopsy is necessary to determine the nature of the lesion.

0967 ROUTINE AND BLIND HISTOLOGICAL DIAGNOSES ON COLONOSCOPIC BIOPSIES COMPARED TO CLINICAL-COLONOSCOPIC OBSERVATIONS IN PATIENTS WITHOUT AND WITH COLITIS. (Eng.) Myren, J.; Serck-Hanssen, A.; Solberg, L. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 11(2):135-140; 1976.

To examine the influence of clinical information on the histologic diagnosis, a blind study was made in which colonoscopic biopsies were examined by two pathologists who had no knowledge of the clinical history or findings of patients with and without colitis. The results were then compared to the diagnosis at routine histologic examination and to the clinical-colonoscopic diagnosis. The role of experience in assessing gastrointestinal disease was also examined. Of the 110 patients (64 women and 46 men) examined, complete agreement was found between the blind and routine histologic studies in the sections from 69 patients, between the blind histological study and that of colonoscopy in 66 patients, and between the routine histological diagnoses and those of colonoscopy in 73 patients (66%). The diagnosis of a normal colonic mucosa was made by blind study on colonoscopic biopsies in 32 patients, by the routine study in 36 patients, and by clinical-colonoscopic examination in 40 cases; the percentage of agreement with the colonoscopic diagnosis was 68 and 72, resp. The diagnosis of unspecific nonulcerative colitis was made by the blind histologic study in 43 patients, by the routine histologic examination in 58 cases, and by colonoscopy in 41 patients. The percentage of agreement between the histologic studies and the clinical-colonoscopic diagnoses was 61 and 78, resp. A diagnosis of ulcerative colitis was made by the blind histologic study in 35 patients, by the routine histologic examination in 16, and by colonoscopy in 27 cases. The percentages of agreement between the histologic studies and the diagnoses by clinical-colonoscopic examination were 82 and 59, resp. The differences in symptomatology between groups were small, except for a high occurrence of diarrhea and blood in stool in cases with ulcerative colitis, as evaluated by blind histologic study. These findings stress the importance of following defined criteria for histologic examination.

0968 THE DIAGNOSTIC ACCURACY OF BARIUM STUDIES OF THE STOMACH AND DUODENUM--CORRELATION WITH ENDOSCOPY. (Eng.) Laufer, I.; Mullens, J. E.; Hamilton, J. (McMaster Univ. Medical Centre, Hamilton, Ontario, Canada L8S 4J9). *Radiology* 115:569-573; 1975.

The radiologic and endoscopic findings of 240 patients examined by fiberoptic endoscopy were compared, and the diagnostic accuracy of the standard barium meal was evaluated and compared to the double contrast technique. The patients were divided into two groups according to the type of radiological study performed. In 175 patients examined by a standard barium contrast technique, there were 39 radiological errors (22%). The most common cause of error was failure to detect an abnormality on the radiograph and prominent mucosal folds which could either mask or simulate small lesions. In 65 patients examined by a formal double contrast technique using effervescent pills and a thick barium suspension, there were four radiological errors (6%). In addition, superficial gastric erosions were demonstrated in seven patients. It is concluded that double contrast radiography appears to offer the potential for significant improvements in diagnostic accuracy.

0969 GLUCAGON AND BARIUM ENEMA EXAMINATIONS: A CONTROLLED CLINICAL TRIAL.

(Eng.) Harned, R. K.; Stelling, C. B.; Williams, S.; Wolf, G. L. (Univ. Nebraska Medical Center, Omaha, NB 68105). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 126(5):981-984; 1976.

The effect of glucagon on bowel relaxation and patient discomfort during barium enema examination was assessed in a double-blind crossover clinical trial. Ten healthy volunteers received placebo and 2 mg glucagon i.m. preceding barium enema examination on separate days. In addition, 50 patients were given either placebo or 2 mg glucagon i.m. prior to barium enema examination. The results of 38 variables determined on each study population were similar; when glucagon was given, both the patients and examiners noted significantly less discomfort and more bowel relaxation. There were no significant changes in pulse, blood pressure, or electrocardiogram. Adverse reactions did not occur frequently enough to allow confident comparison of placebo and glucagon. It is concluded that the use of glucagon can provide a more comfortable barium examination with acceptable safety.

0970 FATAL BARIUM INTRAVASATION DURING BARIUM ENEMA.

(Eng.) Cove, J. K. J.; Snyder, R. N. (Kaiser Foundation Hosp., 1510 North Edgemont, Los Angeles, CA 90027). *Radiology* 112(1): 9-10; 1974.

The case of a 64-yr-old woman who died after massive intravasation of barium sulfate suspension during routine barium enema is presented. The patient died almost immediately after a retention catheter had been placed to facilitate barium flow. Autopsy revealed an obstructing inflammatory mass in the sigmoid colon at 15 cm composed of multiple adherent loops of large and small intestine, connective tissue, and fat. Barium sulfate particles were found in many blood vessels throughout the lungs, kidneys, myocardium, duodenum, rectum, myometrium, endocervix, brain, urinary bladder, and perthyroidal fat. A combination of factors may contribute to the occurrence of intravasation of barium sulfate during barium enema, i.e., mucosal inflammation, intestinal obstruction, increased intraluminal pressure, or misplacement of the catheter tip. Symptoms and survival may be related to the amount of barium that enters the systemic circulation, the age and health of the patient, and the timing of the start of resuscitative measures.

0971 INTRAOPERATIVE FINE-NEEDLE BIOPSY AND CYTODIAGNOSIS OF THE TUMORS OF THE PERIAMPULLARY REGION.

(Eng.) Bodner, E.; Lederer, B. (Surgical Clinic, Univ. Innsbruck, Austria). *Chir. Gastroenterol.* 9(3):385-389; 1975.

The value of intraoperative fine-needle aspiration biopsy (with the Franzen-instrumentarium) and cytodiagnosis as a method of improved differentiation of tumorous lesions of the head of the pancreas (carcinoma, chronic pancreatitis) was tested in 71 patients. Out of 52 tumors histologically diagnosed at a later stage (by operation or autopsy), 43 were detected by this method. Two false-negative and no false-positive results were produced. The Franzen puncture caused no complications of any kind. The results indicate that the cytological method affords several advantages (e.g., a higher degree of precision) over the conventional intraoperative frozen section technique, and it fully meets the clinical requirements of rapid diagnosis during operation.

0972 CEA LEVELS IN FLUIDS BATHING GASTROINTESTINAL TUMORS.

(Eng.) Molnar, I. G.; Vandevoorde, J. P.; Gitnick, G. L. (Dept. Medicine, Univ. California, Los Angeles, CA). *Gastroenterology* 70(4):513-515; 1976.

A controlled prospective study was undertaken to compare plasma carcinoembryonic antigen (CEA) levels with CEA levels in fluids that bathe tumors. In addition, the ability of the radioimmunoassay of plasma CEA and CEA in fluids bathing tumors to reveal underlying malignancies of the gastrointestinal tract was assessed. CEA titers were normal (less than 2.5 ng/ml) in the plasma of 42 healthy volunteers. Normal CEA levels were also found in the plasma and in the colonic mucus of 14, the gastric juice of 18, duodenal drainage of 10, and bile of 11 normal control subjects. The colonic mucus of 3 patients with ulcerative colitis, gastric secretions of 5 benign gastric ulcer patients, bile specimens from 11 normal control subjects and from 5 gallstone patients contained CEA at concentrations below 2.5 ng/ml. Positive CEA titers were found in the fluids bathing tumors of all 23 patients with colonic carcinoma, 9/17 patients with gastric carcinoma, and all 6 patients with pancreatic carcinoma. In contrast, positive CEA titers were found in the plasma of only 16 of 23 patients with colon carcinoma, 6 of 17 patients with gastric carcinoma, and 4 of 6 patients with pancreatic carcinoma. Among 46 patients with gastrointestinal malignancies, CEA was detected in significant concentrations in the plasma of 26 patients and in fluids bathing tumors of 38 patients. These results indicate a significant association of adenocarcinoma of the colon with CEA-positive colonic mucus and suggest the usefulness of assaying CEA in fluids bathing tumors for the detection of gastrointestinal malignancies.

0973 PERCUTANEOUS BIOPSY OF CARCINOMA OF THE PANCREAS GUIDED BY ANGIOGRAPHY.

(Eng.) Tylen, U.; Arnesjo, B.; Lindberg, L. G.; Lunderquist, A.; Akerman, M. (Univ. Hosp., Lund, Sweden). *Surg. Gynecol. Obstet.* 142(5):737-739; 1976.

The possibility of obtaining cytologic diagnosis of pancreatic tumors, using selective visceral angiography as a guide for percutaneous, transperitoneal

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fine-needle aspiration biopsy, was investigated in 29 patients with pancreatic carcinoma. Positive results of biopsy were obtained in 14 of 18 large tumors (those displaying encasement of extrapancreatic arteries and venous obstruction), in 5 of 7 medium-sized tumors (those causing arterial encasement restricted to pancreatic arteries and venous involvement), and in 3 of 4 small carcinomas (arterial encasement limited to intrapancreatic arteries without venous involvement). The smallest tumor measured 3 cm in diameter. This procedure is recommended whenever histological verification is desired because it is simple and causes no complications.

0974 GASTROESOPHAGEAL (GE) SCINTISCANNING TO DETECT AND QUANTITATE GE REFLUX. (Eng.) Fisher, R. S.; Malmud, L. S.; Roberts, G. S.; Lobis, I. F. (Temple Univ. Health Sciences Center, 3401 N. Broad St., Philadelphia, PA 19140). *Gastroenterology* 70(3):301-308; 1976.

Thirty patients with heartburn and a positive acid-reflux test and 20 normal control subjects were studied to evaluate the use of gastroesophageal (GE) scintiscan in the detection and quantitation of GE reflux. Conventional diagnostic tests including barium esophagography, fluoroscopy, esophagogastroscopy, esophageal biopsy, acid perfusion testing, and esophageal manometry were performed on each patient. None of these techniques was sufficiently sensitive in detecting GE reflux. In contrast, GE reflux was visualized by scintiscanning in 27 of 30 patients. The GE reflux index was significantly greater in reflux patients (11.7), compared to controls (2.7). These studies suggest that GE scintiscanning can quantitate and detect GE reflux accurately, rapidly, noninvasively, and with greater sensitivity than other diagnostic techniques.

0975 ORAL ADMINISTRATION OF A CHYMOTRYPSIN-LABILE PEPTIDE--A NEW TEST OF EXOCRINE PANCREATIC FUNCTION IN MAN (PFT). (Eng.) Gyr, K.; Stalder, G. A.; Schiffmann, I.; Fehr, C.; Vonderschmitt, D.; Fahrlaender, H. (Kantonsspital, CH-4004 Basel, Switzerland). *Gut* 17(1):27-32; 1976.

The usefulness of urinalysis of para-aminobenzoic acid (PABA) following the breakdown of administered N-benzoyl-L-tyrosyl-PABA by chymotrypsin as an index of exocrine pancreatic function was tested in man, and the results were compared with the Lundh test. N-benzoyl-L-tyrosyl-PABA (1 g) was administered p.o. to 24 controls, 15 patients with chronic exocrine pancreatic disease, 13 patients after an attack of acute pancreatitis, 2 patients with gluten-sensitive enteropathy, and 10 patients with biliary tract disease, peptic ulcer, or other disease of the gastrointestinal tract. The Lundh test was also performed in 51 cases. In the normal subjects, a mean of 59.6 ± 12.2% of the peptide-PABA was excreted over a 6-hr period. PABA excretion in the patients with exocrine pancreatic deficiency was significantly less ($p<0.001$) than in controls. With one exception, no overlap of data was noted. In the group with pancreatic deficiency, a significant relation was shown between the new test and the Lundh test. These preliminary data justify further investigation of this procedure as a possible new oral test of exocrine function, especially in chronic pancreatitis.

0976 SOURCES OF THE SERUM ISOAMYLASES AND THEIR NORMAL RANGE OF VARIATION WITH AGE. (Eng.) Skude, G. (Malmo General Hosp., S-214 01 Malmo, Sweden). *Scand. J. Gastroenterol.* 10(6): 577-584; 1975.

The isoamylase patterns of various human tissue homogenates and body fluids were analyzed after electrophoretic separation, and the development of the normal variation of the concentrations of the serum isoamylases during fetal life and childhood were determined. The isoamylase patterns indicated that a significant production of amylase occurred in the salivary glands, the pancreatic gland, and in some organs of the female, but not of the male genital tract. Comparison of the isoamylase pattern of urine with that of serum revealed an increased activity of the main pancreatic isoamylase fraction. The activity of amylase in serum was derived from isoenzymes originating from the salivary glands or the pancreatic gland. A very low activity of the salivary isoamylases was regularly found in serum from 14-week-old fetuses. The activity increased steadily with age and reached the normal adult level, about 80 U/l, at the age of 5 yr. The pancreatic group of isoamylases in serum developed later. There was no demonstrable pancreatic isoamylase activity in the majority of children less than 3 months old. Activity rose slowly to reach adult level at age 10-15 yr. The activity did not vary with sex, and diurnal variation of the isoamylase was negligible. A previous study which found inherited variation of the salivary and pancreatic isoamylase pattern during the first year of life is confirmed by the present investigation.

0977 DIRECT MEASUREMENT OF SERUM NON-CAERULOPLASMIN COPPER IN LIVER DISEASE. (Eng.) Frommer, D. J. (St. Vincent's Hosp., Sydney, N.S.W. 2010, Australia). *Clin. Chim. Acta* 68(3):303-307; 1976.

The serum nonceruloplasmin copper concentrations were measured in 19 normal subjects and in 68 patients with various types of liver disease by a sensitive direct method involving complexing the copper and use of atomic absorption spectrophotometry. In normal subjects the mean concentration (± S.D.) was 10.1 ± 1.6 µg/100 ml, with men having a slightly higher value (10.7 ± 1.3 µg/100 ml) than women (9.2 ± 1.8 µg/100 ml). In five patients with various nonhepatic diseases, concentrations were raised (15.8 ± 8.9 µg/100 ml), as also in 19 patients with hepatitis (14.7 ± 4.3 µg/100 ml), 13 patients with cholestasis (16.1 ± 6.4 µg/100 ml) and 5 patients with cirrhosis (16.3 ± 8.7 µg/100 ml). Thirteen heterozygotes for Wilson's disease and nine patients treated for Wilson's disease had concentrations (12.9 ± 5.9 and 9.8 ± 3.7 µg/100 ml, resp.) that did not differ significantly from normal, whereas four untreated patients had significantly raised concentrations (22.9 ± 4.5 µg/100 ml). The author concludes that direct measurement of serum nonceruloplasmin copper is more accurate than indirect measurement and it may help in assessing the effect of treatment. However, measurement of this fraction of serum copper will not enable Wilson's disease to be differentiated from other forms of liver disease.

0978 GASTRIC PSEUDO-ULCERS: MEMBRANA ANGULARIS AND PYLORIC TORUS DEFECTS. (Eng.) Peavy, P. W.; Clements, J. L., Jr.; Weens, H. S. (Emory Univ. Sch. Medicine, 80 Butler St., S.E., Atlanta, GA 30303). *Radiology* 114(2):591-595; 1975.

Two pseudoniches, pyloric torus and membrana angularis defects, that present as pseudo-ulcerations are described. In the region of the membrana angularis, all three gastric muscle layers (longitudinal, circular, and oblique) are absent or attenuated, creating the bulge seen at fluoroscopy in the prepyloric region. Roentgenographic studies indicate that the bulge appears along the distal lesser curvature even in the normal patient, but changes with peristalsis and usually disappears entirely. Retention of barium during air contrast studies by this niche usually confuses peptic ulcer diagnosis by suggesting a second ulceration or an overestimation of the actual size of the true ulcer. A pyloric torus defect may occur in the midportion of the pyloric canal along the greater or lesser curvature or both. A prolapsed portion, occurring during maximal contraction of the two muscular loops of the pyloric sphincter, creates a transient diamond shaped collection of contrast material during roentgenographic examination in normal patients. A persistent defect may indicate peptic ulcer disease or other conditions causing pylorospasm or hypertrophy. The authors suggest that radiologists can avoid gastric pseudo-ulcers by anticipating the normal variations of the pyloric torus and membrana angularis.

0979 THE CURRENT STATUS OF ANGIOGRAPHY IN GASTROINTESTINAL BLEEDING. (Eng.) Jackson, D. C.; Johnsrude, I. S.; Phillips, J. (Duke Univ. Medical Center, Durham, NC 27710). *J. Can. Assoc. Radiol.* 26(4):266-270; 1975.

0980 HEMORRHAGE FROM THE GASTROESOPHAGEAL JUNCTION: A CRYPTIC ANGIOGRAPHIC DIAGNOSIS. (Eng.) Northrop, C. H.; Studley, M. A.; Smith, G. R. (Harborview Medical Center, 325 Ninth Ave., Seattle, WA 98104). *Radiology* 117(3):531-532; 1975.

0981 NEWER TECHNIQUES IN GASTROINTESTINAL RADIOLOGY. (Eng.) Lawson, T. L. (George Washington Univ. Medical Center, 901 23rd St., N.W., Washington, DC 20037). *Univ. Mich. Med. Cent. J.* (416):14-18; 1975.

0982 TIME REDUCTION IN THE D-XYLOSE TEST. STANDARDIZATION OF DOSE. (Eng.) Moraes-Filho, J. P. P.; Bonini, N.; Sipahi, A.; Neves, D. P.; Marlet, J. M.; Laudanna, A. A.; Bettarello, A. (Instituto de Gastroenterologia, R. Silvia, 276, Sao Paulo 01331, Brasil). *Arq. Gastroenterol.* 12(2):105-110; 1975.

0983 COMPARISON OF SERUM GASTRIN RADIOIMMUNOASSAY KITS. (Eng.) Sampson, E. J.; Demers, L. M. (Milton S. Hershey Medical Center, Hershey, PA 17033). *Clin. Biochem.* 9(2):62-64; 1976.

0984 COMPUTED TOMOGRAPHY OF THE ABDOMEN: EARLY EXPERIENCE WITH THE EMI BODY SCANNER. (Eng.) Stephens, D. H.; Hattery, R. R.; Sheedy, P. F., II (Mayo Clinic, Rochester, MN 55901). *Radiology* 119:331-335; 1976.

0985 COMPUTED TOMOGRAPHY OF THE THORAX AND ABDOMEN; A PRELIMINARY REPORT. (Eng.) Alfidi, R. J.; Haaga, J.; Meaney, T. F.; MacIntyre, W. J.; Gonzalez, L.; Tarar, R.; Zelch, M. G.; Boller, M.; Cook, S. A.; Jelden, G. (Cleveland Clinic Foundation, 9500 Euclid Ave., Cleveland, OH 44106). *Radiology* 117(2):257-264; 1975.

0986 FUNCTIONAL RADIOLOGICAL FINDINGS IN HIRSCHSPRUNG'S DISEASE AND IN OTHER CASES OF DYSCHEZIA. (Eng.) Nussle, D.; Genton, N.; Bozic, C. (Clinique Universitaire de Pediatrie, 30, Boulevard de le Cluse, Hopital Cantonal, CH 1205 Geneve, Switzerland). *Ann. Radiol. (Paris)* 19(1):111-122; 1976.

0987 DOUBLE CONTRAST UPPER GASTROINTESTINAL STUDIES. (Eng.) Hunt, J. H.; Anderson, I. F. (Royal North Shore Hosp., Sydney, Australia). *Clin. Radiol.* 27(1):87-97; 1976.

0988 INSTRUMENTATION AND METHODS FOR INTRALUMINAL ESOPHAGEAL MANOMETRY. (Eng.) Dodds, W. J. (Milwaukee County Medical Complex, 8700 W. Wisconsin Ave., Milwaukee, WI 53226). *Arch. Intern. Med.* 136(5):515-523; 1976.

0989 ANGIOGRAPHIC DIAGNOSIS OF PARADUODENAL HERNIA. (Ger.) Wenz, W.; Schwaiger, M. (Abteilung fur Roentgendiagnostik der Universitat, 78 Freiburg, Hugstetter Str. 55, Germany). *Dtsch. Med. Wochenschr.* 100(38):1902-1904; 1975.

0990 A SIMPLE METHOD FOR ROUTINE DOUBLE-CONTRAST STUDY OF THE UPPER GASTROINTESTINAL TRACT. (Eng.) Laufer, I. (McMaster Univ. Medical Center, Hamilton, Ontario, Canada L8S 4J9). *Radiology* 117(3):513-518; 1975.

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0991 FLUOROSCOPY OF THE UPPER GASTROINTESTINAL TRACT BY THE RADIOLOGICAL TECHNOLOGIST. (Eng.) Lewicki, A. M. (Harvard Medical Sch., 25 Shattuck St., Boston, MA 02115). *Radiology* 115(2): 581-584; 1975.

0992 RADIOLOGICAL STUDY OF BARIUM FOLLOW-THROUGH FOLLOWING DIGESTION OF NATURAL SODA WATER. (Fre.) Delestre, J.-P.; Godlewski, J.-L. (Hopital de Nanterre, 403, av. de la Republique, 92000 Nanterre, France). *Sem. Hop. Paris* 51(5):303-309; 1975.

0993 CHANGING CLINICAL AND ROENTGENOGRAPHIC PATTERNS OF NECROTIZING ENTEROCOLITIS. (Eng.) Rabinowitz, J. G.; Siegle, R. L. (Univ. Tennessee Center Health Sciences, 865 Jefferson Ave., Memphis, TN 38163). *Am. J. Roentgenol.* 126(3):560-566; 1976.

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0996 SERUM LYSOZYME IN CROHN'S DISEASE AND ULCERATIVE COLITIS. (Eng.) Hylander, E.; Hansen, N. E.; Karle, H.; Janrum, S. (Rigshospitalet, 2100 Copenhagen O, Denmark). *Scand. J. Gastroenterol.* 11(2):213-217; 1976.

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0998 RADIOLOGY NOW: THE COLON PACIFIED. (Eng.) Simpkins, K. C. (General Infirmary, Leeds LSI 3EX, England). *Br. J. Radiol.* 49(580):303-305; 1976.

0999 COLONOSCOPY: EXPERIENCE WITH 300 EXAMINATIONS. (Fre.) Weill, J.-P.; Kerschen, A.; Monath, C.; Baumann, R. (C.H.U. 67005 Strasbourg Cedex, France). *J. Med. Strasbourg* 6(5):279-285; 1975.

1000 PRELIMINARY RESULTS OF GREY-SCALE ULTRASONOGRAPHY IN THE DETECTION OF VINYL CHLORIDE RELATED LIVER AND SPLEEN DISEASE. (Eng.) Taylor, K. J. W.; Barrett, J. J.; Williams, D. M. J.; Smith, P. M.; Duck, B. W. (Yale Univ. Sch. Medicine, New Haven, CT). *Proc. R. Soc. Med.* 69(4):292-295; 1976.

1001 GRAY SCALE ULTRASONIC INVESTIGATION OF FOCAL DEFECTS ON ^{99m}Tc SULPHUR COLLOID LIVER SCANNING. (Eng.) Garrett, W. J.; Kossoff, G.; Uren, R. F.; Carpenter, D. A. (Royal Hosp. Women, Paddington 2021, Sydney, Australia). *Radiology* 119:425-428; 1976.

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1005 LIVER UPTAKE OF ^{99m}Tc-DIPHOSPHONATE. (Eng.) Chaudhuri, T. K. (Eastern Virginia Medical Sch., Hampton, VA 23667). *Radiology* 119:485-486; 1976.

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1008 VISUALIZATION OF THE BILE DUCTS USING FOCUSED ULTRASOUND. (Eng.) Reid, M. H. (Univ. California Sch. Medicine, San Francisco, CA 94143). *Radiology* 118(1):155-158; 1976.

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1011 DETAIL VISIBILITY OF IN VIVO MICRORADIOGRAPHY OF THE BILIARY TRACT IN DAILY CLINICAL PRACTICE. (Jpn.) Yamazaki, T.; Kinjo, T.; Hayami, A. (Osaka Univ. Res. Inst. Microbial Diseases, Osaka, Japan). *Nippon Acta Radiol.* 34(12):873-879; 1974.

1012 VALUE OF IMMUNOLOGICAL METHODS IN THE POST-THERAPEUTIC FOLLOW-UP OF HEPATOBILIARY PARASITOSES. (Fre.) Capron, A.; Paris, J.; Capron, M.; Darwiche, H. (Centre Hospitalier, Universitaire de Lille, Place de Verdun, F 59000 Lille, France). *Tijdschr. Gastroenterol.* 17(1):17-23; 1974.

1013 NEW COMPOUNDS: SYNTHESIS OF ALIPHATIC SELENO AMINO ACIDS AS POTENTIAL PANCREATIC IMAGING AGENTS. (Eng.) Sadeh, T.; Davis, M. A.; Giese, R. W. (Soreq Nuclear Res. Center, Yavne, Israel). *J. Pharm. Sci.* 65(4):623-625; 1976.

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1015 ASCENDING CHOLANGIOGRAPHY DURING SURGERY. (Spa.) Gomez-Ferrer, F.; Ruiz del Castillo, J. (Facultad de Medicina, Universidad de Valencia, Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 46(3):249-256; 1975.

1016 RADIOLOGICAL SIGNS OF ACUTE PANCREATITIS. (Eng.) Balthazar, E. J.; Lutzker, S. (New York Medical Coll., New York, NY). *CRC Crit. Rev. Clin. Radiol. Nucl. Med.* 7(3):199-242; 1976.

1017 THE VALUE OF RADIOLOGICAL INVESTIGATIONS IN THE DIAGNOSIS OF PYLORIC STENOSIS IN INFANTS. (Pol.) Langda-Kława, B.; Klincewicz, B. (Z Oddzialu Chirurgii Ogolnej Szpitala Chirurgii Urazowej Dzieciecej w Warszawie, Poland). *Pediatr. Pol.* 50(6):749-752; 1975.

See also, 0803, 1018, 1068, 1072, 1081, 1120, 1122, 1123, 1144, 1155, 1176, 1182, 1184, 1190, 1203, 1207, 1218, 1234, 1242, 1270, 1271, 1272, 1280, 1284, 1289, 1301, 1315, 1319, 1351, 1352, 1402, 1427, 1446, 1447, 1450, 1454, 1465, 1474, 1480, 1418, 1525, 1528, 1529, 1537, 1546, 1548.

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GASTROINTESTINAL DISEASES

ESOPHAGUS

1018 ROENTGEN FINDINGS IN AORTO-ENTERIC FISTULAE.

(Eng.) Wyatt, G. M.; Rauchway, M. I.; Spitz, H. B. (Cincinnati General Hosp., Cincinnati, OH 45267). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 126(4):714-722; 1976.

Roentgenological features are presented from six cases of aorto-enteric fistulas. In three patients (two men and one woman, aged 62-73 yr), the aorta ruptured into the duodenum; in the other three (two women and one man, aged 78-81 yr), it ruptured into the esophagus. The roentgen signs in the three cases with fistulas into the duodenum included primarily extrinsic pressure on the third portion of the duodenum. In one case, the entire duodenum was filled with clot and the tract between the duodenum and the ruptured graft was filled with barium. In other cases, there was effacement of the duodenal folds in the area of extrinsic pressure. This combination of findings in a patient with severe upper gastrointestinal bleeding suggests a fistulous communication. Failure to demonstrate the bleeding point by angiography should not exclude this possibility. Both anteroposterior and lateral aortograms should be obtained if angiography is performed. In two of the cases with aorto-enteric fistulas into the esophagus, there was a mixture of the barium with the laminated clot in the aneurysm. Also, there was loculation of barium outside both the aneurysm and the esophagus in the mediastinum. In one case, the barium flow was obstructed in the esophagus by an apparent intramural defect. In all cases, there was an aneurysm present in the area of the defects with calcification in the wall, making aorto-enteric fistula the most likely diagnosis. Recognition of these signs may permit early diagnosis and subsequent life saving surgical correction.

1019 PEPSIN SECRETION, PEPSINOGEN, AND GASTRIN IN "BARRETT'S ESOPHAGUS." CLINICAL AND MORPHOLOGICAL CHARACTERISTICS.

(Eng.) Mangla, J. C.; Schenk, E. A.; Desbaillets, L.; Guarasci, G. Kubasik, N. P.; Turner, M. D. (Monroe Community Hosp., 435 East Henrietta Road, Rochester, NY 14603). *Gastroenterology* 70(5):669-676; 1976.

The morphological characteristics of Barrett's esophagus in four patients (three men and one woman, aged 51-75 yr) are described. In addition, the notions that this mucosa contains gastrin and that it secretes pepsins under basal conditions are demonstrated for the first time. Three of the patients presented with significant esophageal bleeding and one presented with high esophageal stricture. Baker's tubes with an intragastric balloon were used to prevent reflux; the patients were stimulated with Histalog (β-aminoethyl pyrazole hydrochloride); and esophageal secretions were obtained from three of the four patients. These three did show pepsin in their esophageal secretions. In two cases, the secretions were sufficient to measure pepsin by chemical assay. In one of these, there was an apparent slight increase in acid production after administration of the stimulant, and neither case showed any increase in pepsin output. The esophageal secretion revealed a pattern of proteolytic enzymes on agar gel electrophoresis pH 5.7 different from that of gastric secretion. In one case, the esophageal secretion pattern was very similar to esophageal mucosal patterns. The study also revealed that Barrett's mucosa have even more of the functional characteristics of gastric mucosa. In two cases, esophageal mucosal gastrin was raised 5-10 times above the level in controls with and without hiatus hernia. The mucosa contained either cathepsin or cathepsin and pepsinogens in all cases. The usual clinical treatment of antacids, bedrest, and elevating the head of the bed failed in all of these patients. After Nissen's fundoplication, the bleeding stopped in the two patients who consented to the operation. One patient who repeatedly refused surgery bled for 5 months. Remarkable healing of esophageal mucosa was noted on endoscopy. However, in spite of the dramatic reversion of symptoms, there was no reversion of the mucosa to normal stratified squamous epithelium, and no significant change in esophageal enzyme patterns was seen in a follow-up 9 months and 3 years later. Observations made on multiple biopsies demonstrated that certain types of epithelial cellular elements were constantly present, whereas other cellular elements were variable. The constant elements were the tall columnar epithelial cells and the goblet cells. The inconstant cell types were parietal and chief cells.

1020 PREOPERATIVE ESTIMATION OF ABDOMINAL LYMPH NODE METASTASES OF THE ESOPHAGEAL CARCINOMA.

(Jpn.) Okamoto, Y.; Obitsu, R. (Tokyo Univ. Branch Hosp., Japan). *Gan No Rinsho* 21(2):96-102; 1975.

From examination of 121 surgical cases of esophageal carcinoma, four preoperative x-ray findings were correlated with presence of metastasis to the gastric lymph nodes. The esophagus was divided into upper, middle, and lower sections. Lesions were defined by shape as localized, almost localized, intermediate, and nonlocalized. Sizes of ulcers (over 20 mm deep), intensified shadow in the hilum or paramediastinum, and deformity of the cardia of the stomach were the other three criteria. In the upper esophagus, metastasis was rare when surgical prognosis was good. In the middle esophagus, metastases to the gastric lymph nodes occurred frequently when lesions were intermediate or nonlocalized and at least one of the other three criteria was present. Metastases occurred infrequently in the middle and lower esophagus when lesions were localized or almost-localized and the other three criteria were lacking. In the lower esophagus (not including the cardia), metastases very frequently accompanied x-ray findings of intermediate or nonlocalized lesions. Deformity of the cardia was accompanied by gastric lymph node metastases in 13/15 cases. The authors conclude that these four preoperative x-ray findings

re not sufficiently valid for the definitive estima-
ion of esophageal carcinoma.

021 GASTROESOPHAGEAL INVOLVEMENT IN HERPES SIMPLEX.

(Eng.) Howiler, W.; Goldberg,
. I. (Univ. California Sch. Medicine, San Francisco,
A 94143). *Gastroenterology* 70(5):775-778; 1976.

he case of a 25-yr-old woman with acute myelogenous
eukemia who developed disseminated herpes simplex
nvolving both esophagus and stomach is presented.
ver a 3-yr period, the patient was treated with
ytosine arabinoside, 6-theoguanine, and other immuno-
uppressive drugs. When she received a bone marrow
ransplant, the patient developed an ulcerating labial
esion, diagnosed as herpes type II infection, asso-
iated with tender left inguinal nodes. When epi-
astric discomfort developed, endoscopy disclosed
iscrete vesicles with erythematous bases in the
iddle and distal esophagus and superficial ulcers
n the proximal greater and lesser curvatures of the
omach. Barium-air double contrast radiography re-
ealed multiple, coarse nodules separated by interlac-
g crevices and many shallow ulcers. Biopsy specimens
the gastric and esophageal mucosa, and of the lung,
nowed eosinophilic intranuclear inclusion bodies typi-
l of herpes simplex. The authors conclude that cor-
ct identification of moniliasis or herpes simplex is
portant as each disorder has a specific therapy.

22 ABNORMAL ESOPHAGEAL MOTILITY IN PRIMARY SJOGREN'S SYNDROME.

(Eng.) Ramirez-Mata,
; Pena-Ancira, F. F.; Alarcon-Segovia, D. (Insti-
to Nacional de la Nutricion, San Fernando y Viaducto
alpan, Mexico 22, D. F. Mexico). *J. Rheumatol.*
1):63-69; 1976.

study was conducted to determine whether abnormali-
es of esophageal function occurred in 10 patients
th Sjogren's syndrome, not associated with rheuma-
id arthritis, systemic lupus erythematosus, or pro-
essive systemic sclerosis. Abnormalities were
tected in 9 of the 10 patients. All nine had absent
reduced contractility in the upper third of the
ophagus as compared to normal subjects. Five of
e nine also showed abnormalities in other portions
the esophagus: three had spontaneous biphasic and
iphasic tertiary contractions in the lower two-
irds; in one, the diminished intraluminal pressure
tended down to the middle third; and in one, there
s diminished pressure at the lower esophageal sphinc-
r. All but one of the patients had normal esophageal
entgenographic findings; this patient, with abnormal
traluminal pressure at the lower esophageal sphincter,
s shown to have a diaphragmatic hernia. All of the
ur patients who had Raynaud's phenomena also had eso-
ageal dysfunction. However, there were five patients
th esophageal dysfunction who did not have Raynaud's
enomena. Two of the patients had associated thyroid
sease, probably related to Hashimoto's thyroiditis,
d one had malabsorption syndrome possibly due to
uten enteropathy. The observations indicate that
imary Sjogren's syndrome is associated frequently
th motor dysfunction of the upper third of the
ophagus, which may occasionally extend to lower
gments. This motor dysfunction seems to be a previously unrecognized manifestation of primary Sjogren's syndrome. The high prevalence of lacrimal and salivary gland involvement, as well as of esophageal motor dysfunction, which occurs in the various connective tissue disorders, suggests that these abnormalities may be markers of the immunologic derangement which seems to be their common denominator.

1023 EFFECT OF ORAL METOCLOPRAMIDE ON GASTROESOPHAGEAL REFLUX IN THE POST-CIBAL STATE.

(Eng.) Behar, J.; Biancani, P. (Veterans Admin. Hosp., West Haven, CT 06516). *Gastroenterology* 70(3):331-335; 1976.

The effect of p.o. metoclopramide (15 mg), AlMgOH (30 ml), and placebo on the cumulative duration of gastroesophageal reflux induced by a protein-rich meal was compared in 15 male patients with reflux esophagitis. The metoclopramide was found to be more effective than AlMgOH in reducing the cumulative duration of reflux after placebo over a 3-hr period. The same dose of metoclopramide increased resting lower esophageal sphincter pressures in all 15 patients for at least 1 hr and prevented gastroesophageal reflux after an intragastric acid load (300 ml of 0.1 N HCl) in 8 of 10 patients. However, metoclopramide failed to increase the amplitude of esophageal contractions and acid clearing of the distal esophagus. These findings suggest that p.o. metoclopramide (15 mg) may be valuable in the management of reflux esophagitis.

1024 THE EFFECT OF ORAL AND INTRAVENOUS METOCLOPRAMIDE ON HUMAN LOWER ESOPHAGEAL SPHINCTER PRESSURE.

(Eng.) Cohen, S.; Morris, D. W.; Schoen, H. J.; DiMarino, A. J. (Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *Gastroenterology* 70(4):484-487; 1976.

Lower esophageal sphincter (LES) pressure was evaluated in response to p.o. or i.v. metoclopramide in eight normal subjects and in eight patients with symptomatic gastroesophageal reflux. Both p.o. and i.v. administration routes of metoclopramide gave a dose-related increase in LES pressure. Complete dose-response curves to the p.o. administered compound showed greater absolute responsiveness in normals as compared to patients with LES incompetence. The generally accepted p.o. dose of 10.0 mg of metoclopramide gave a slight increase in LES pressure that was not consistent in all symptomatic patients. These studies suggest that higher doses of metoclopramide may be required for treating symptomatic gastroesophageal reflux secondary to LES incompetence.

1025 PHYSIOLOGY AND PATHOPHYSIOLOGY OF THE LOWER ESOPHAGEAL SPHINCTER.

(Eng.) Castell, D. O. (Natl. Naval Medical Center, Bethesda, MD 20014). *Ann. Otol. Rhinol. Laryngol.* 84(5):569-575; 1975.

1026 DIET AND THE LOWER ESOPHAGEAL SPHINCTER.

(Eng.) Castell, D. O. (Natl. Naval Medical Center, Bethesda, MD 20014). *Am. J. Clin. Nutr.* 28(11):1296-1298; 1975.

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1029 PALLIATIVE TRANSTUMORAL INTUBATION FOR MALIGNANT ESOPHAGEAL OBSTRUCTION. A NEW PROSTHESIS WITH AN ANTIREFLUX DEVICE. (Spa.) Davidenko, N.; Chifflet, J. Fossati, C. G.; Tiscornia, E.; Pradines, J. (Clinica Quirurgica B, Montevideo, Uruguay). *Cir. Del Urug.* 45(1):39-43; 1975.

1030 MANOMETRY OF THE ESOPHAGUS AFTER SURGERY WITH LOOP INTERPOSITION. (Por.) Brandalise, A. B. (Dept. de Fisiologia, Universidade de Campinas, UNICAMP, Caixa Postal 1170, Sao Paulo, Brazil). *Arq. Gastroenterol.* 12(1):5-11; 1975.

1031 AN END POINT FOR PNEUMATIC DILATION OF ACHALASIA. (Eng.) Cohen, N. N. (Mercy Catholic Medical Center, P.O. Box 19709, Philadelphia, PA 19143). *Gastrointest. Endosc.* 22(1):29; 1975.

1032 MEGAESOPHAGUS DUE TO CARDIAC ACHALASIA. (Ita.) Valentino, A.; Signorelli, I. (Ospedale Maggiore, Bergamo, Italy). *Chir. Patol. Sper.* 23(1):16-46; 1975.

1033 ESOPHAGEAL CANCER IN ISRAEL: SELECTED CLINICAL AND EPIDEMIOLOGICAL ASPECTS. (Eng.) Shani, M.; Modan, B. (Chaim Sheba Medical Center, Tel Hashomer, Israel). *Am. J. Dig. Dis.* 20(10):951-954; 1975.

1034 POLYPOID SARCOMAS OF THE ESOPHAGUS: A RARE BUT POTENTIALLY CURABLE NEOPLASM. (Eng.) DeMeester, T. R.; Skinner, D. B. (Univ. Chicago Pritzker Sch. Medicine, 950 E. 59th St., Chicago, IL 60637). *Ann. Thorac. Med.* 20(4):405-417; 1975.

1035 SMALL CELL EPIDERMOID CARCINOMA OF THE ESOPHAGUS: AN OAT-CELL-LIKE CARCINOMA. (Eng.) Rosen, Y.; Moon, S.; Kim, B. (Downstate Medical Center, 450 Clarkson Ave., Brooklyn, NY 11203). *Cancer* 36(3):1042-1049; 1975.

1036 OBSTRUCTION: THE MOST DISTRESSING COMPLICATION OF ESOPHAGEAL CARCINOMA. (Eng.) Palmer, E. D. (Hackettstown Community Hosp., Hackettstown, NJ). *Am. Fam. Physician* 12(5):138-139; 1975.

1037 RADIOTHERAPY OF CARCINOMA OF THE THORACIC ESOPHAGUS. (Fre.) Baillet, F.; Pierquin, B. (Hopital Henri Mondor, 51, avenue de Lattre de Tassigny, 94010 Creteil, France). *Ann. Gastroenterol. Hepatol.* 11(2):143-146; 1975.

1038 MYOBLASTOMAS (GRANULAR CELL TUMORS) OF THE ESOPHAGUS. (Ger.) Clemencon, G.; Gloor, F. (FMH, Frohheimweg 12, CH-4600 Olten, Switzerland). *Z. Gastroenterol.* 8(5):529-530; 1975.

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1040 PROBLEMS IN THE SURGICAL TREATMENT OF SLIDING HIATAL HERNIA. (Ger.) Peters, H.; Reifferscheid, M. (Abteilung Chirurgie der Medizinischen Fakultat der RWTH Aachen, D-5100 Aachen, Goethestrasse 27/29, Germany). *Langenbecks Arch. Chir.* 338(4):243-250; 1975.

1041 HIATAL HERNIA: A FOLLOW-UP STUDY. (Eng.) Havia, T.; Inberg, M. V.; Aalto, T.; Puhakka, H. J. (Dept. Surgery, Univ. Turku, Turku, Finland). *Acta Chir. Scand.* 141(5):378-384; 1975.

1042 HIATAL HERNIA: SECONDARY BRACHYESOPHAGUS AND CANCER OF THE GASTROESOPHAGEAL JUNCTION. (Fre.) Chatelin, C.-L.; Rouison, D.; Hammou, J.-C. (Centre Hospitalier Princesse Grace, Monaco). *Sem. Hop. Paris* 51(23):1542-1543; 1975.

1043 A CASE OF MALLORY-WEISS SYNDROME. (Eng.) Keng, N. B. (Alexandra Hosp., Singapore). *Singapore Med. J.* 16(1):76-77; 1975.

1044 MALLORY-WEISS SYNDROME: REPORT ON 20 CASES. (Ger.) Knoblauch, M.; Lammli, J.; Frey, P.; Funk, C.; Deyhle, P.; Stevka, E.; Schauwecker, H.; Sauberli, H. (Kantonsspital, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Z. Gastroenterol.* 8(5):531; 1975.

1045 GASTRIC SECRETION, GASTROESOPHAGEAL REFLUX AND ESOPHAGITIS. (Eng.) Stanciu, C. (Medical Inst. Jassy, Jassy, Rumania). *Am. J. Gastroenterol.* 64(2):104-107; 1975.

1046 REFLUX ESOPHAGITIS: PATHOGENESIS, DIAGNOSIS, AND MANAGEMENT. (Eng.) Behar, J. (Veterans Admin. Hosp., Spring St., West Haven, CT 06516). *Arch. Int. Med.* 136(5):560-566; 1976.

1047 RECURRENT BRONCHOPNEUMONITIS AND GASTRO-ESOPHAGEAL REFLUX. (Fre.) Baculard, A. (Hopital Trousseau, 26, av. du Dr. Arnold-Netter, Paris 12, France). *Pediatre* 11(51):101-114; 1975.

1048 SPONTANEOUS RUPTURE OF THE ESOPHAGUS: LITERATURE REVIEW. (Rus.) Seferovskii, L. E.; Voronetskii, I. B. (I. M. Sechenov 1st Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (6):131-133; 1975.

1049 SPONTANEOUS RUPTURE OF THE ESOPHAGUS. (Ger.) Hunziker, H. R.; Fehr, H. F. (Kantonsspital, CH-5001 Aarau, Switzerland). *Z. Gastroenterol.* 8(5):531-532; 1975.

1050 DEGLUTITION (CONTINUED): IX. ESOPHAGEAL ULCER. (Fre.) Nemours-Auguste, S.; Barag, N. (Hopital Paul-Brosse, Villejuif, France). *Ouest Med.* 28(11):739-783; 1975.

1051 ROLE OF CALCITONIN IN STRESS ULCER FORMATION OF VARIOUS RAT MODELS. PRELIMINARY REPORT. (Eng.) Schwille, P. O.; Steiner, H.; Samberger, N. M.; Schellerer, W. (Dept. Surgery, Univ. Erlangen-Nuernberg, Erlangen, West Germany). *Z. Gesamte Exp. Med.* 165(3):291-296; 1975.

1052 UPPER OESOPHAGEAL WEB IN CHILDHOOD. (Eng.) Maclean, A. D.; Houghton-Allen, B. W. (Royal Children's Hosp., Flemington Rd., Parkville, Victoria 3052, Australia). *Pediatr. Radiol.* 3(4): 240-241; 1975.

1053 MEDIASTINAL ESOPHAGEAL DUPLICATION CYST ASSOCIATED WITH A PARTIAL PERICARDIAL DEFECT. (Eng.) Kassner, E. G.; Rosen, Y.; Klotz, D. H., Jr. (Downstate Medical Center, 450 Clarkson Ave. [Box 45], Brooklyn, NY 11203). *Pediatr. Radiol.* 4(1):53-56; 1975.

See also, 0974, 0980, 1067, 1102, 1140, 1154.

STOMACH

1054 REFLECTION ON OCCULT BLOOD REACTION ON FECES AS THE PRIMARY FILTER IN MASS SURVEY FOR GASTRIC DISEASE. (Jpn.) Umeda, K.; Okamoto, S.; Shintani, Y.; Saitoh, K.; Hara, M.; Kanematsu, H.; Tatara, T.; Iwamiya, K. (Tokyo Medical Coll., Tokyo, Japan). *J. Tokyo Med. Coll.* 32(3):631-636; 1974.

Occult blood reaction in feces was used as the primary filter in a mass survey (5820 men and 296 women) for gastric disease. One-time testing with the benzidine method was conducted, and no diet restrictions were imposed during the test. There were 5195 persons participating in occult blood reaction tests; 852 had positive results (for those 40 yr or older, 523/2015 positive cases). When indirect x-rays were taken on 764 of the positive cases, abnormalities were found in 150 (those 40 yr or older, 102/478 abnormalities). Follow-up examinations on 140 abnormal x-ray cases found 76 trouble-free, 1 gastric sarcoma, 1 gastric carcinoma (stage IIc + III), 12 gastric ulcers, 15 gastric ulcer scars, 4 gastric polyps, 6 duodenal ulcers, 1 polyp in the duodenal region; and 27 other abnormalities. Gastric sarcoma had a low positive occult blood reaction. Gastric ulcer scars, gastric polyps, and the duodenal polyp were discovered incidentally, not as a result of occult blood reactions. Thus, occult blood reaction had very definite limitations as a primary filter. The authors prefer indirect x-rays to identify gastric diseases and recommend mass education about screening examinations.

1055 AN EXPERIMENTAL STUDY ON ATYPICAL EPITHELIAL PROLIFERATIONS ASSOCIATED WITH CHRONIC ULCERATION OF THE STOMACH WITH SPECIAL REFERENCE TO EARLY CARCINOGENESIS. (Eng.) Kanahara, H. (Niigata Univ. Sch. Medicine, Niigata, Japan). *Acta Med. Biol.* 21(3/4):133-168; 1974.

Lantan-gel ulcers and electrocoagulation ulcers were induced in the glandular stomach of 77 Donryu rats and 103 mastomys, and epithelial proliferations associated with the ulceration and chronological changes toward a malignant nature were studied. There were 45 chronic ulcers at the site of treatment with lantan-gel and electrocoagulation and at the site of gastrotomy. In a second experiment, N-methyl-N'-nitro-N-nitrosoguanidine (NG) was used to promote malignant transformation in epithelial proliferations at the margins of chronic ulcers produced in the stomach of Wistar rats and mastomys. Ulcers at the site of the lantan-gel treatment and at the site of gastrotomy showed a higher incidence of chronic lesions than those at the site of electrocoagulation.

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Histologic analysis of chronic ulcerations showed fibroblastic fibrosis associated with particles of lantan-gel and suture material in the ulcer base to be a main cause of interference with ulcer healing. Bethanechol chloride, a parasympathicotonic agent, did not seem to be highly effective for disturbing ulcer healing. A variety of epithelial proliferation associated with chronic ulceration can be histologically divided into regeneration (simple epithelial proliferation), glandular proliferation, adenomatous proliferation, atypical epithelial proliferation, and frankly malignant proliferation in order of chronologic changes. The longer the period of experimental course, the higher the incidence of atypical epithelial proliferation. Lantan-gel ulcers followed by NG administration revealed a considerably high incidence of chronic ulceration. Various grades of atypical epithelial proliferations at the ulcer margin and base were yielded by NG administration to Wistar rats bearing lantan-gel ulcers; four cases of these produced adenocarcinomas. Based on gross appearances, the chronic ulcers were classified into four types: small round ulcer, large round ulcer, large irregular ulcer, and irregularly healing ulcer. In general, small round ulcers were accompanied by regenerative proliferation of the epithelium at the margin, large round ulcers by glandular proliferation or adenomatous proliferation, large irregular ulcers and irregularly healing ulcers by atypical epithelial proliferation. The results suggest that marginal epithelial proliferation of an experimental chronic gastric ulcer possesses the capability of transforming to atypical and, further, to malignant changes.

1056 STUDIES ON INTRA-OPERATIVE RADIOTHERAPY OF GASTRIC CANCER.

(Jpn.) Abe, M.; Yabumoto, E.; Takahashi, M.; Tobe, T. (Kyoto Univ., Kyoto, Japan). *Nippon Acta Radiol.* 34(3):146-154; 1974.

Thirty-eight patients with different stages of gastric carcinoma were treated by intra-operative irradiation on a specially-designed operating table. A pentagonal treatment cone was used that encompassed the lymph node groups along the left gastric, common hepatic arteries and around the celiac axis. Clinical results demonstrated that intra-operative radiotherapy (single dose of 3,500 R with 8 MeV electrons), on localized small lesions that remain after surgery, can lead to cure without damage to normal structures. Minimum irradiation dosage of 3,000 R is necessary; 4,000 R could probably be tolerated when large tumors are involved. When peritoneal metastasis was present, 13/14 patients died within 1 yr and 1/14 within 2 yr. With curative or noncurative surgery, 4/24 (2 cases at stage IV) survived longer than 5 yr. For successful intra-operative radiotherapy, the original cancer site must be removed by gastrectomy. No hepatic or peritoneal metastases must be present. Metastases to the lymph nodes must be limited to the secondary lymph nodes. Radiotherapy is applicable, even when invasion through the serosa to the head of the pancreas is present.

1057 JUVENILE POLYPOSIS AND GASTROINTESTINAL CARCINOMA: A STUDY OF A KINDRED.

(Eng.) Stemper, T. J.; Kent, T. H.; Summers, R. W. (Univ. Iowa Coll. Medicine, Iowa City, IA). *Ann. Intern. Med.* 83(5):639-646; 1975.

Case reports of a kindred having at least 10 members with single or multiple juvenile polyps of the stomach and large intestine, and with 11 members with gastrointestinal carcinoma are presented. The degree of association between juvenile polyps and gastrointestinal carcinoma was investigated. A patient who had had a subtotal colectomy for multiple polyps in 1968 was admitted to the hospital in 1974 for evaluation of abdominal pain. There was considerable evidence of cancer in the immediate family, and a medical history of all relatives was traced through family members, physicians, hospital records, and death certificates. Twenty-three affected members of the family showed a spectrum of involvement by both isolated and multiple juvenile polyps. Two patients had multiple juvenile polyps of the stomach and large intestine, while at least four patients had multiple juvenile polyps of the large intestine. Three patients had only one to four juvenile polyps of the large intestine, and one patient had single polyps of the jejunum and rectum. Another patient had multiple juvenile polyps of the stomach. The earliest age at which symptoms occurred in this kindred was 10 yr. Rectal bleeding and anemia were the most common initial symptoms. The occurrence of both generalized and colonic polyposis in the same kindred suggests that these are different expressions of the same disorder. In this kindred, gastric, duodenal, and cecal carcinomas were relatively common, while there were no cases of primary rectal or sigmoid cancer. The pattern of occurrence of juvenile polyps and carcinoma suggests inheritance by a single autosomal dominant gene with a high degree of penetrance and pleomorphic phenotypes. The disorder is manifested by isolated or multiple polyps in the alimentary tract or carcinoma of various digestive organs, or both, including stomach, duodenum, pancreas, appendix, or colon.

1058 EFFECT OF PROSTAGLANDIN 15(R)15 METHYL-E_2 METHYL ESTER ON ASPIRIN AND TAUROCHOLIC ACID-INDUCED GASTRIC MUCOSAL HAEMORRHAGE IN RATS.

(Eng.) Carmichael, H. A.; Nelson, L.; Russell, R. I.; Chandra, V.; Lyon, A.; Cochran, K. M. (Royal Infirmary, Glasgow, Scotland, G4 OSF). *Gut* 17(1):33-36; 1976.

The effect of p.o. administered prostaglandin 15(R)15 methyl-E_2 methyl ester on aspirin and taurocholic acid-induced gastric mucosal hemorrhage was studied in male Sprague-Dawley rats. The incidence of hemorrhage induced by aspirin (26.7 mM), 64 mg/kg, together with taurocholic acid (2.5 mM), was significantly reduced from 53.6% to 19.5% by the addition of the prostaglandin (9.9 μM). The incidence of hemorrhage induced by aspirin alone (53.3 mM), 128 mg/kg, was significantly reduced from 80% to 20% by the addition of prostaglandin (9.9 μM). These results suggest the possible use of synthetic prostaglandins in the prevention of aspirin-induced gastric pathology.

1059 INVOLVEMENT OF THE GASTRIC ANTRUM IN MENETRIER'S DISEASE.

(Eng.) Olmstead, W. W.; Cooper, P. H.; Madewell, J. E. (Armed Forces Inst. Pathology, Washington, DC 20306). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 126(3):524-529; 1976.

The roentgenologic distribution of enlarged folds in 13 cases of Menetrier's disease are described, and 6 cases of this condition with antral involvement are reported. The corpus, either alone or in combination with another part, was involved more frequently than either the antrum or the fundus. The antrum alone and the fundus alone were affected infrequently, but the antrum in combination with the corpus was involved with moderate frequency (5 of 13 cases). The greater curvature was involved more frequently (85%) than the lesser curvature (54%). Although the already acknowledged higher percentage of greater curvature corpus involvement was again demonstrated (77%), the lesser and greater curvatures of the antrum were affected in almost 50% of the cases. The dominant macroscopic finding was the presence of large, firm folds of gastric mucosa. Gross abnormalities of the submucosa, muscularis propria, and serosa were not found. From the results of this study and earlier studies, the salient histologic feature was thickening of the mucosa from elongation of the tubular gastric glands and deepening of gastric pits; individual cells were not enlarged. This change seems best categorized as hyperplasia and not hypertrophy. In six cases, inflammatory cells were mildly increased in a patchy or diffuse distribution. Results indicate that antral disease should no longer be considered exceptional, especially when other areas of the stomach are involved. Therefore, it is important to include Menetrier's disease in the differential diagnosis of enlarged folds affecting any part of the stomach.

1060 THE INFLUENCE OF BODY TEMPERATURE ON THE PRODUCTION OF ULCERS OF RESTRAINT IN THE RAT.

(Eng.) Antoon, J. W.; Gregg, R. V. (Univ. Louisville Sch. Medicine, Louisville, KY 40201). *Gastroenterology* 70(5):747-750; 1976.

Hypothermia accompanying the production of restraint ulcers in rats was studied to determine if it is causally related to the ulcer. Female Sprague-Dawley rats were restrained for 18 hr while rectal temperatures were monitored with a telethermometer probe. Body temperatures of rats restrained at room temperature fell 5.0 C in the first 5 hr. Gastric ulceration in this group was 100%. When body temperatures were maintained at 38 C, only 26% developed ulcers. The results indicate that depressed body temperature during restraint is causally related to ulceration, and that the degree of hypothermia resulting from restraint correlates well with the severity of ulceration. Prevention of hypothermia reduces the incidence of ulcers.

1061 EFFECT OF FIRST PART OF DUODENUM ON GASTRIC EMPTYING IN DOGS: RESPONSE TO ACID, FAT, GLUCOSE, AND NEURAL BLOCKADE.

(Eng.) Cooke, A. R.; Clark, E. D. (Veterans Hosp., Univ. Iowa, Iowa City, IA 52240). *Gastroenterology* 70(4):550-555; 1976.

The inhibitory role of the first 5 cm of the duodenum on gastric emptying was studied in five dogs given a gastric and a duodenal fistula 5 cm distal to the pylorus. The test meal was instilled (300 ml at 37 C, containing phenol red 40 mg/l) into the stomach and was collected from the duodenal fistula at 1- or 2-min intervals for 10 or 20 min. As the test meal emptied from the stomach, it bathed the first 5 cm of duodenum, stimulating the appropriate receptor. A Foley catheter with an inflated balloon prevented passage into the second part of the duodenum. Test meals of hypertonic glucose (15%, 865 mOsm/kg) or 20 and 80 mM of sodium oleate emptied at the same rate as water when allowed to bathe the first 5 cm of duodenum, whereas test meals of 100 mM of HCl were slowed. Using neural blocking agents, the emptying of water meals was slowed with s.c. atropine sulfate (0.03 and 0.15 mg/kg), i.v. hexamethonium chloride (10 mg/kg), and norepinephrine bitartrate (0.04 mg/kg). The emptying of 100 to 120 mM HCl meals was slowed by s.c. atropine sulfate (0.03 and 0.15 mg/kg), norepinephrine bitartrate (0.04 mg/kg), and the i.v. α-receptor blocking agents phenoxybenzamine HCl (2 mg/kg) and phentolamine (2 mg/kg); was unaffected by i.v. hexamethonium chloride (10 mg/kg); and was unchanged (1.0 mg/kg) or slightly slowed (2.0 mg/kg) by the β-receptor blocker propranolol. In contrast, acid test meals were emptied at the same rate as water when treated with i.v. guanethidine monosulfate (2 mg/kg) or i.m. reserpine (1 mg/kg), indicating that the acid inhibition was mediated by an adrenergic mechanism. The emptying of water meals was unchanged by these two drugs. The authors suggest that the first 5 cm of duodenum contain receptors for inhibiting the emptying of acid but not for fat or hypertonic glucose. The neural blocking studies indicate that the inhibitory effect of acid in the first part of the duodenum is an adrenergic mechanism that appears to be neither α- nor β-receptor-mediated.

1062 DYNAMIC GASTRIC RESPONSE TO EXPANSION BEFORE AND AFTER VAGOTOMY.

(Eng.) Jahnberg, T.; Martinson, J.; Hulten, L.; Fasth, S. (Sahlgren's Hosp., Goteborg, Sweden). *Scand. J. Gastroenterol.* 10(6):593-598; 1975.

The dynamic gastric pressure response to expansion by direct intragastric air insufflation, 30-50 ml/sec, was studied in 12 healthy volunteers, 15 nonoperated ulcer disease patients, and in 20 patients operated upon with antrectomy (5), antrectomy and vagotomy (5), or proximal selective vagotomy (10). A nasogastric tube was inserted with the tip placed in the corpus of the stomach. The tube was connected to the top outlet of a reservoir and then in turn connected to a pressure receptor. Continuous pressure recordings were made during gastric expansion with 500 ml air. Nonoperated individuals accepted gastric expansion without considerable increase of pressure. Antrectomized patients showed a higher basal pressure and a moderate increase of pressure during expansion. Vagotomized patients, including the ones operated upon with proximal selective vagotomy, demonstrated a marked increase of pressure during expansion. The results indicate that vagal dener-

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vation of the corpus fundus of the stomach is followed by an impairment of the gastric reservoir function.

1063 STUDY OF THE GASTRIC MUCOSA IN 320 SUBJECTS. (Spa.) Toril Illescas, M.; Huelin Benitez, J. (Residencia Sanitaria "Carlos Haya," Malaga, Spain). *Rev. Esp. Enferm. Apar. Dig.* 46(2):171-186; 1975.

1064 EFFECT OF SOMATOSTATIN ON BETAZOLE-STIMULATED GASTRIC SECRETION AND CARBACHOL-STIMULATED PANCREATIC SECRETION AND GALLBLADDER CONTRACTION IN MAN. (Ger.) Lankisch, P. G.; Arnold, R.; Creutzfeldt, W. (Medizinische Universitatsklinik, 34 Gottingen, Humboldtallee 1, Germany). *Dtsch. Med. Wochenschr.* 11(36):1797-1800; 1975.

1065 EXPERIMENTAL ELECTROCOAGULATION OF DOG GASTRIC MUCOSA. (Eng.) Papp, J. P.; Fox, J. M.; Wilks, H. S. (Michigan State Univ. Sch. Medicine, Grand Rapids, MI). *Gastrointest. Endosc.* 22(1):27-28; 1975.

1066 RECURRENT GASTROINTESTINAL BLEEDING IN OSLER'S DISEASE SUCCESSFULLY TREATED BY ENDOSCOPIC GASTRIC ELECTROCOAGULATION. (Ger.) Weingart, J.; Lux, G.; Ottenjann, R.; Elster, K. (Stadtisches Krankenhaus Munchen-Neuperlach, D-8 Munchen, Germany). *Z. Gastroenterol.* 8(5):542-543; 1975.

1067 CONSEQUENCES OF THE COLONIC GASTRONEO-ESOPHAGEAL REFLUX (EXPERIMENTAL STUDY). (Eng.) Raskai, A.; Maros, T.; Krisar, Z.; Seres-Sturm, M.; Lakatos, M. (Hosp. Nr. 1, Oradea, Rumania). *Abdom. Surg.* 18(3):55-58; 1976.

1068 GASTROGRAFIN IN POSTOPERATIVE MALFUNCTION OF THE GASTRIC STOMA. (Fle.) De Coster, M.; Rutgeerts, L. (St. Jozefsklinik, St. Rafaelsstraat, 15, 8700 Izegem, Belgium). *Tijdschr. Gastroenterol.* 18(2):106-112; 1975.

1069 EFFECT OF BOMBESIN ON EXTRAGASTRIC GASTRIN IN MAN. (Eng.) Basso, N.; Lezoche, E.; Materia, A.; Giri, S.; Speranza, V. (Istituto III Patologia Chirurgica, Univ. di Roma, 00100 Roma, Italy). *Am. J. Dig. Dis.* 20(10):923-927; 1975.

1070 GASTRIC ACID SECRETORY DIFFERENCES IN PATIENTS WITH HEINEKE-MIKULICZ AND FINNEY PYLOROPLASTIES. (Eng.) Hall, W. H.; Read, R. C. (Univ. Oklahoma Health Sciences Center , P.O. Box 26901, Oklahoma City, OK 73190). *Am. J. Dig. Dis.* 20(10):947-950; 1975.

1071 SYMPTOMATIC HYPERGASTRINAEMIA WITH ACHLORHYDRIA: RELIEF BY ANTRECTOMY. (Eng.) Thompson, C. D.; Mackay, I. R.; Hansky, J. (Walter and Eliza Hall Inst. Medical Res., Post Office, Royal Melbourne Hosp., Victoria 3050, Australia). *Aust. N.Z. J. Med.* 5(4):356-359; 1975.

1072 SUTURE ENTANGELEMENT [SIC] OF CYTOLOGY BRUSH DURING GASTROSCOPY. (Eng.) Cordoba, I.; Dyrszka, H. (Veterans Admin. Hosp., East Orange, NJ 07019). *Gastrointest. Endosc.* 22(1):49; 1975.

1073 AN ARTERIOVENOUS GASTRO-RIGHT EPIPLOIC FISTULA FOLLOWING GASTRECTOMY IN A PATIENT WITH KIDNEY FAILURE WHO WAS DIALYZED AND THEN RECEIVED A KIDNEY TRANSPLANT. (Fre.) Rampal, M.; Olmer, M; Salvadori, J.-M.; Savatovsky, I.; Sermit, G. (No affiliation given). *Arch. Fr. Mal. App. Dig.* 64(3):290; 1975.

1074 THE PREVENTION AND TREATMENT OF SOME COMPLICATIONS RESULTING FROM GASTRECTOMY. (Rus.) Sizov, O. G. (Riga Medical Inst., USSR). *Khirurgiia (Mosk.)* (6):96-100; 1975.

1075 THE CORRELATION OF FUNCTIONAL AND PATHOLOGICAL FINDINGS IN "ANTRAL DISEASE." (Ger.) Liebermann-Meffert, D.; Allgower, M. (Kantonsspital, CH-4000 Basel, Switzerland). *Z. Gastroenterol.* 8(5):536-537; 1975.

1076 GASTRIC BEZOARS. (Ger.) Nauer, E.; Filippini, L. (Kantonsspital, CH-6004 Luzern, Switzerland). *Z. Gastroenterol.* 8(5):535-536; 1975.

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1078 A CASE REPORT OF COLLISION TUMOR (COEXISTENCE OF CARCINOMA AND SARCOMA) OF THE STOMACH. (Jpn.) Nakayama, K.; Imasato, K.; Yanagi, A.; Hamada, M.; Nakayama, K.; Ueda, S. (Kurume Univ. Sch. Medicine, Japan). *Gan No Rinsho* 21(11):935-938; 1975.

1079 SURGERY FOR GASTRIC CANCER: REVIEW AND CRITERIA FOR SURGERY. (Spa.) Carda Abella, P.; Moreno Gonzalez-Bueno, C. (Servicio Quirurgico Aparato Digestivo, "Fundacion Jimenez Diaz," Spain). *Rev. Esp. Enferm. Apar. Dig.* 46(2):145-160; 1975.

1080 COMPLICATIONS OCCURRING AFTER PALLIATIVE SURGERY FOR CARCINOMA OF THE GASTROESOPHAGEAL JUNCTION. (Rus.) Krivonogov, B. B.; Krivonogov, I. B. (Omsk Medical Inst., USSR). *Khirurgiia (Mosk.)* (8):106-109; 1975.

1081 RHABDOMYOSARCOMA OF THE DUODENUM WITH SINUS TRACT FORMATION INTO THE GASTRIC WALL, VISUALIZED BY GASTRODUODENOSCOPY. (Eng.) Yamada, K.; Douglass, H. O.; Holyoke, E. D. (Roswell Park Memorial Inst., 666 Elm St., Buffalo, NY 14263). *Am. J. Dig. Dis.* 20(9):871-875; 1975.

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1084 GASTRIC CANCER IN ADOLESCENTS. (Spa.) Calero Ayala, B. (Residencia Sanitaria "Teniente Coronel Norena," Cordoba, Spain). *Rev. Esp. Enferm. Apar. Dig.* 46(1):77-84; 1975.

1085 BENIGN VASCULAR TUMOR OF THE STOMACH. (Rus.) Khomiakov, Iu. S.; Golonzko, N. R.; Vlasova, I. N. (N. I. Pirogov 2nd Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (7):106-107; 1975.

1086 CARCINOMA IN THE GASTRECTOMIZED STOMACH: A STUDY FROM A PRIVATE GROUP PRACTICE OF GASTROENTEROLOGY. (Ger.) Clemencon, G.; Baumgartner, R.; Leuthold, E.; Miller, G.; Neiger, A. (FMH, Frohheimweg 12, CH-4600, Olten, Switzerland). *Z. Gastroenterol.* 8(5):532-533; 1975.

1087 GASTRIC AND EXTRAGASTRIC LEIOMYOBLASTOMA: REPORT OF SIX NEW CASES WITH A REVIEW OF THE LITERATURE. (Eng.) Langley, J. R. (Eastern Virginia Medical Sch., Norfolk, VA). *Am. Surg.* 42(5):369-375; 1976.

1088 HEMORRHAGIC GASTRITIS: ANALYSIS OF THREE CASES TREATED WITH SODIUM BICARBONATE PERFUSION. (Spa.) Madureri, V.; Carrillo, N. (Hospital General, Instituto Venezolano de los Seguros Sociales, Caracas, Venezuela). *GEN* 28(2/3/4):91-97; 1974.

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1090 A CASE OF POSTGASTRECTOMY AFFERENT LOOP OBSTRUCTION SECONDARY TO CANCER OF THE STOMACH SIMULATING PSEUDOCYST OF THE PANCREAS. (Eng.) Feiss, J. S.; Plevy, D. J.; Luckman, G. S.; Lenit, O. S., Jr. (Univ. Miami Medical Sch., Coral Gables, FL). *Am. J. Dig. Dis.* 20(10):995-998; 1975.

1091 ACTION OF PHENTONIUM IN THE PREVENTION OF STRESS ULCERS IN RATS. (Por.) Jacob, E.; Costa, D. P.; Alvarez, L. A.; Furlani, S. L. R.; Barbosa, J. C. C. (Univ. Federal, Juiz de Fora, Brazil). *Rev. Bras. Clin. Ter.* 3(7):295-300; 1975.

See also, 0932, 0968, 0972, 0978, 0979, 0980, 0987, 0990, 1017, 1021, 1024, 1028, 1039, 1040, 1042, 1045, 1047, 1095, 1100, 1103, 1107, 1109, 1110, 1112, 1129, 1147, 1161, 1188, 1320, 1419, 1467, 1495, 1506, 1551.

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Peptic Ulcers

1092 ASPECTS OF BASAL GASTRIC SECRETION IN MAN. (Eng.) Saunders, J. H. B.; Thjodleifsson, B.; Wormsley, K. G. (Dept. Therapeutics, Univ. Dundee, Dundee, Scotland). *Digestion* 12(3):183-188; 1975.

The effect of experimental manipulation on basal (spontaneous) gastric secretion was studied in 14 patients with duodenal ulcer. The rates of secretion and outputs of acid and pepsin decreased in patients subjected to venesection by 30-50%. In 8 of 11 patients, basal secretion of acid was significantly less ($p<0.05$) after overnight aspiration than when measured immediately after introduction of the aspiration tube in the morning (controls). An overnight indwelling tube, without aspiration, reduced basal secretion of acid in 5/10 subjects compared to controls. Overnight infusion of sodium and potassium chloride raised the output of acid in three subjects to levels greater than those observed in controls. These studies demonstrate that the common technique of detecting abnormal gastric secretory function by measuring basal gastric secretion may be effected by experimental manipulation of the subjects.

1093 DUODENAL ULCERS: EARLY AND LATE ONSET. (Eng.) Lam, S. K.; Ong, G. B. (Queen Mary Hosp., 4 Hong Kong). *Gut* 17(3):169-179; 1976.

A study of 1042 hospitalized duodenal ulcer patients (822 men and 220 women) was undertaken to determine the relation of the age of onset of ulcer dyspepsia with the blood group and with the family history of ulcer dyspepsia. Those patients whose symptoms began in the first two decades of life (early onset patients) contained a significantly larger proportion of blood groups A, B, and AB and a significantly stronger family history of dyspepsia than those whose symptoms began from the fourth decade of life onwards (late onset patients). Blood group O prevailed in the late onset patients, and was associated with a proneness to duodenal ulceration and bleeding, and in the late onset patients, a significant proneness to bleed recurrently and severely. Bleeding was the predominent complication in the early onset patients. There was a significantly increased tendency for the late onset ulcers to perforate, to become stenosed, to cause severe pain, and to be multiple, postbulbar, or giant. While these features did not appear to be related to the effect of aging, the occurrence of associated gastric ulceration and the mortality rate were related. In addition, the results suggest a strong genetic predisposition for early onset ulcers.

1094 CLEARANCE AND ACID-STIMULATING ACTION OF HUMAN BIG AND LITTLE GASTRINS IN DUODENAL ULCER SUBJECTS. (Eng.) Walsh, J. H.; Isenberg, J. I.; Ansfield, J.; Maxwell, V. (UCLA Sch. Medicine, Los Angeles, CA 90024). *J. Clin. Invest.* 57(5):1125-1131; 1976.

Acid-stimulating action and clearance of pure natural human big gastrin (HG-34-I) and little gastrin (HG-17-I) were assessed in four men (mean age 49 yr) with inactive duodenal ulcer (DU) disease. Disappearance half-times for HG-17-I after i.v. infusion (5.2 min) or rapid i.v. injection (6.4 min) were six to eight times shorter than those for HG-34-I (41.5 and 37.8 min, resp.). Studies of clearance of synthetic human little gastrin (HG-17-I) were performed in 3 of these subjects, 8 additional male DU subjects, and 11 normal men. The disappearance half-time of synthetic HG-17-I averaged 6.2 min in both the DU subjects and the normal subjects. This suggests that the clearance of exogenous gastrin is not altered in patients with DU. Acid secretion in response to rapid i.v. injection of HG-34-I reached a higher peak and lasted longer than in response to an equimolar dose of HG-17-I; the total response to HG-34-I was about three times that to HG-17-I. During constant i.v. infusion, acid responses to equimolar exogenous doses of the two peptides were similar but the increment in molar concentration of circulating gastrin was six to eight times greater with HG-34-I than with HG-17-I. Chromatography of serum obtained during infusions of HG-34-I revealed no evidence of conversion to HG-17-I, nor was there any increase in circulating G-34 activity during infusions of HG-17-I. The increment in serum gastrin concentration required to produce half-maximal stimulation of gastric acid secretion (D_{50}) was estimated in each subject for each gastrin from curves relating acid secretion to change in serum gastrin concentration produced by infusion of these peptides. Increases in circulating G-17 and G-34 in response to peptone solution instilled into the stomach, taken together, were equivalent to 1.5 times the D_{50} determined from infusions of G-34 and G-17. Acid secretion during the same time period averaged 55% of maximal rates. Although G-34 comprised approximately 75% of the total molar concentration of circulating gastrin after stimulation, it was estimated to contribute less than half of the acid-stimulating activity.

1095 SERUM GROUP I PEPSINOGEN LEVELS AND THEIR RELATION TO GASTRIC ACID SECRETION IN PATIENTS WITH AND WITHOUT RECURRENT ULCER. (Eng.) Samloff, I. M.; Secrist, D. M.; Passaro, E., Jr. (Harbor General Hosp., Torrance, CA). *Gastroenterology* 70(3):309-313; 1976.

Serum group I pepsinogen (PG I) levels were determined by radioimmunoassay in 15 patients with, and in 27 patients without, recurrent ulcer, after vagotomy and either a gastric resection or a drainage procedure. The mean levels were 151.8 ng/ml in the patients with recurrent ulcer and 79.7 ng/ml in those without recurrence. A recurrent ulcer was present in 6 of 7 patients with an elevated serum PG I (over 175 ng/ml) but not in any of 10 patients with a low serum PG I (under 50 ng/ml). The correlation between serum PG I and peak acid output (PAO) was statistically significant in patients with recurrent ulcer and in those without recurrence. In patients with recurrent ulcer, a serum PG I level within the normal range (50-175 ng/ml) was uniformly associated with a PAO of more than 10 mEq/hr. In contrast, of 10 patients without recurrent ulcer and a normal serum PG I, 8 had a PAO of less than 10 mEq/hr. The results show that the mean level of serum PG I in patients with recurrent ulcer is significantly higher than in symptomatic patients without recurrence, and suggest that a serum PG I level beyond the limits of noraml (50-175 ng/ml) for subjects without operations may have diagnostic significance.

1096 GASTRINS IN TISSUE: CONCENTRATION AND COMPONENT PATTERNS IN GASTRIC, DUODENAL, AND JEJUNAL MUCOSA OF NORMAL HUMAN SUBJECTS AND PATIENTS WITH DUODENAL ULCER. (Eng.) Malmstrom, J.; Stadil, F.; Rehfeld, J. F. (Rigshospitalet, DK-2100 Copenhagen O, Denmark). *Gastroenterology* 70(5):697-703; 1976.

The total concentration of gastrin and distribution of gastrin components were examined in mucosal biopsies from corpus, antrum, duodenum, and jejunum from normal subjects and patients with duodenal ulcer. The concentration was highest in the antrum, 12.1 nmol/g mucosa for normal subjects and 9.0 nmol/g mucosa for duodenal ulcer patients. A steep gradient was found distally: in the proximal duodenum the concentration was 0.1; in the distal duodenum it was 0.02-0.01; and in the proximal jejunum it was less than 0.01 of the antral concentration. In the corpus of the stomach, the concentrations were similar to those found in the jejunum. Gel filtrations showed that most gastrin immunoreactivity was eluted in positions corresponding to serum component II (gastrin-34-like) and III (gastrin-17-like), but immunoreactivity corresponding to all the components present in serum was found. No interference from cholecystokinin was observed in duodenal biopsies. In corpus, antrum, and jejunum, component III was the predominant form, whereas component II made up half of the immunoreactive gastrin in the duodenum. No major differences were observed between normal subjects and duodenal ulcer patients. There was no simple relation between acid secretion and mucosal gastrin concentration, but ulcer patients with the highest acid secretion had the lowest antral content and the highest duodenal content. The relative importance of the various sites of gastrin production remains unknown; however, it is suggested that the duodenum is a less important source than the antrum.

1097 GASTROCOLIC FISTULA COMPLICATING BENIGN UNOPERATED GASTRIC ULCER. REPORT OF FOUR CASES AND REVIEW OF THE LITERATURE. (Eng.) Akwari, O. E.; Edis, A. J.; Wollaeger, E. E. (Mayo Clinic, Rochester, MN). *Mayo Clin. Proc.* 51(4):223-230; 1976.

Four cases of gastrocolic fistula complicating benign unoperated gastric ulcer are reported and the pertinent literature is reviewed. In two of these cases, the symptoms of acute perforation into the colon were the initial presentation of peptic ulcer disease. The other two patients had peptic ulcer symptoms dating back 12 and 68 months, and histories of aspirin ingestion. All 4 patients had watery diarrhea and weight loss. Barium enema examination was diagnostic in each case. The perforating ulcers were all located in the distal stomach on the greater curvature. Although enterostasis was not present, regurgitation of colonic contents probably caused bacterial overgrowth in the small intestine, producing structural and functional damage to the mucosal cells. Gastroscopy of one case revealed frequent fecal eructations at the ulcer site consistent with a gastrocolic fistula. The four patients were in good condition, making the mandatory preoperative preparation relatively easy. It is suggested that the best surgical plan consists of: careful preoperative preparation with blood, albumin, fluids, and electrolytes, when indicated; bowel preparation with cathartics, enemas, and administration of oral antibiotics; and one-stage en bloc hemigastrectomy and resection of the involved segment of colon along with the fistulous tract. The total number of cases of gastrocolic fistulas complicating benign, previously unoperated gastric or duodenal ulcers reported in the English literature is 43. There is an appreciable mortality associated with this condition; seven of the 43 patients (16%) died as a direct consequence of the complication.

1098 THE RELATION BETWEEN FUNCTIONING PARIETAL CELL AND GASTRIN CELL MASSES IN TWO GROUPS OF DUODENAL ULCER PATIENTS. (Eng.) Byrnes, D. J.; Lam, S. K.; Sircus, W. (St. Vincent's Hosp., Darlinghurst, Australia). *Clin. Sci. Mol. Med.* 50(5): 375-383; 1976.

To determine whether the relation between parietal cell mass and gastrin cell mass is a crucial factor in the pathophysiology of duodenal ulceration, serum gastrin concentrations were determined before and after a standardized meal in 28 patients with duodenal ulcer and in 10 normal control subjects. In response to pentagastrin, 13 of the duodenal ulcer subjects secreted acid within the limits of normal, and 15 secreted in excess. The differences in the basal serum gastrin concentrations between normal subjects, acid "normosecretors," and hypersecretors were not statistically significant, but that of the hypersecretors was suggestively low. The integrated gastrin response and peak gastrin responses to meals were higher in duodenal ulcer patients with normal acid secretion than in the hypersecretors, but the values for the latter were not different from normal subjects. Stabilization of intragastric pH by infusion into the antrum of sodium bicarbonate during the test meal response period did not alter the differences between the two ulcer patient groups. A significant inverse correlation existed between the maximal acid output and the integrated gastrin response in both normal subjects and hypersecreting duodenal ulcer patients. The evidence supports the existence of an inverse relation between the functioning parietal cell and gastrin cell masses and shows the gastrin response in normosecreting ulcer subjects to be inappropriately high. It also suggests that excessive vagotonia exerts trophic effects upon both parietal cell mass and gastrin cell mass.

1099 THE EFFECT OF 16,16-DIMETHYL PROSTAGLANDIN E_2 ON MEAL-STIMULATED GASTRIC ACID SECRETION AND SERUM GASTRIN IN DUODENAL ULCER PATIENTS. (Eng.) Ippoliti, A. F.; Isenberg, J. I.; Maxwell, V.; Walsh, J. H. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *Gastroenterology* 70(4):488-491; 1976.

The effect of intragastric and intraduodenal 16,16-dimethyl prostaglandin E_2 (dm PGE_2) on meal-stimulated gastric acid secretion and gastrin release was studied in seven male patients with inactive duodenal ulcer. Compared to placebo, doses of 0.75, 1.00, 1.33, and 1.77 μg/kg of dm PGE_2 instilled into the stomach, inhibited meal-stimulated gastric acid secretion by 61-94%. The 1.00, 1.33, and 1.77 μg/kg doses inhibited acid secretion significantly more than an optimal dose of propantheline bromide. Intragastric dm PGE_2 (1 μg/kg) was significantly more effective than intraduodenal dm PGE_2 (1 μg/kg) in inhibiting both gastric acid secretion and gastrin release. After 1.33 and 1.77 μg/kg, some patients experienced abdominal cramps, or diarrhea, or both, but at doses of 1.00 μg/kg or less, no apparent side effects were observed. It is concluded that 16,16-dm PGE_2 significantly inhibits meal-stimulated gastric acid secretion and gastrin release, and may be of therapeutic value in patients with peptic ulcer disease, provided that it is free of untoward side-effects with chronic administration.

1100 GASTRIC ANTISECRETORY AND ANTIULCER PROPERTIES OF PGE_2, 15-METHYL PGE_2, AND 16,16-DIMETHYL PGE_2: INTRAVENOUS, ORAL AND INTRAJEJUNAL ADMINISTRATION. (Eng.) Robert, A.; Schultz, J. R.; Nezamis, J. E.; Lancaster, C. (The Upjohn

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Company, Kalamazoo, MI). *Gastroenterology* 70(3): 359-370; 1976.

The antisecretory property of prostaglandin (PG) E_2 was compared with that of two analogues, 15-methyl PGE_2 and 16,16-dimethyl PGE_2, and the anti-ulcer property of PGE_2 was compared with that of 16,16-dimethyl PGE_2. In dogs prepared with denervated gastric pouches (Heidenhain), 16,16-dimethyl PGE_2 was 100-times and 15-methyl PGE_2 was 40-times more active than PGE_2 in inhibiting gastric secretion stimulated by histamine. The methyl analogues were also more active orally, and their action was of much longer duration than that of PGE_2. Volume, acid concentration and output, and pepsin output were reduced in a dose-dependent manner. None of the PG's appreciably affected pepsin concentration. In female Upjohn rats, depending upon the assay used and the route of administration, 16,16-dimethyl PGE_2 was 2-50 times more potent than PGE_2 and was equal to 15-methyl PGE_2. 16,16-Dimethyl PGE_2 also inhibited gastric secretion and prevented the formation of gastric and duodenal ulcers produced in the rat. When given p.o. in dogs, the PG's often caused vomiting. However, when given intrajejunally or i.v. at antisecretory doses, vomiting seldom occurred. The PG's appear to inhibit gastric acid secretion by acting directly on the parietal cells, making them unresponsive to most stimulants. The results of these studies indicate that 15-methyl PGE_2 and 16,16-dimethyl PGE_2 may be of value in the treatment of peptic ulcer.

1101 STUDIES WITH METIAMIDE IN THE PREVENTION OF DUODENAL ULCERATION IN THE RAT.

(Eng.) Kaplan, E.; Barbezat, G. O.; Millner, G. (Groote Schuur Hosp., Cape Town, South Africa). *Gastroenterology* 70(3):475-476; 1976.

Studies to determine whether metiamide prevents the development of duodenal ulceration induced by s.c. infusion of pentagastrin and bethanechol were conducted in the rat. Ulceration was induced in eight of nine rats given pentagastrin (2.5 µg/kg/min) and bethanechol (12 µg/kg/min) by constant infusion for 48 hr. All showed some histologic abnormality, five of them having panmural duodenal changes. None of the eight rats given these infusions simultaneously with metiamide (156 µg/kg/min) infusion showed macroscopic evidence of duodenal ulceration ($p<0.0005$), and only two showed minimal histological changes (i.e., edema and/or ulceration of tips of only one or two villi). These findings demonstrate that duodenal ulcers induced in rats by s.c. infusions of pentagastrin and bethanechol can be prevented by simultaneous infusion of metiamide.

1102 EFFECTS OF METIAMIDE ON THE HUMAN STOMACH.

(Eng.) Thjodleifsson, B.; Wormsley, K. G. (Dept. Therapeutics, Univ. Dundee, Scotland). *Clin. Sci. Mol. Med.* 49(5):445-458; 1975.

The effect of metiamide on gastric acidity was investigated in 17 patients with duodenal ulcer and 4 with esophagitis confirmed endoscopically. Solutions of 200 ml hydrochloric acid or 400 ml glucose were instilled into the stomach and the subsequent rates of gastric secretion and emptying, and the disappearance of acid within the stomach were measured by automatic titration with sodium hydroxide. The Metiamide was given as an i.v. dose of 308 µmol followed by a continuous infusion of 410 µmol/hr. Metiamide inhibited the gastric secretory response to the instilled acid and glucose solutions but did not change the overall pattern of emptying of the instilled solutions. During administration of metiamide, there was a net loss of acid from within the gastric lumen. The rate of disappearance of acid from the instilled acid solution was small and not sufficient to account for the metiamide evoked decrease in the concentration of acid secreted in response to pentagastrin (2.6 nmol for 60 min). It is concluded that metiamide does not inhibit gastric secretion by altering the permeability of the gastric mucosa. The authors propose that the decrease in the acid concentration of gastric juice represents a direct effect of metiamide on the acid-secreting cells of the stomach.

1103 GASTRITIS AND INFLAMMATION OF THE ANASTOMOSIS AFTER GASTRECTOMY FOR ULCERS. RADIOLOGICAL AND ENDOSCOPIC DIAGNOSIS.

(Fre.) Cornet, A.; Barbier, J. Ph.; Henry-Biabaud, E. (Hopital Laennec, 42, rue Sevres, 75340 Paris Cedex 07, France). *Entretiens Bichat Med.* 61-66; 1974.

Ulcer patients (205) who had gastritis and inflammation of the anastomosis after gastrectomy and who underwent endoscopy and gastroduodenal barium transit studies were observed over an 8-yr period. The majority had had a Finster type anastomosis, and the others had been operated upon by the Pean method. No new ulcers or tumors were diagnosed in any of the barium transit studies. In 137 patients, endoscopy revealed many lesions on the gastric stump. The mucous membrane consistently showed two types: the first type was congestive and very inflammed, corresponding to edematous and catarrhal gastritis; in the other type, the membrane was smooth and transparent allowing the vessels of the submucosa to be observed and suggesting typical atrophic gastritis. A total of 115 macroscopic alterations were visible in the 205 endoscopic examinations. Biopsy material obtained from the 205 patients revealed granulomas and 9 cases of carcinoma of the gastric stump. The authors conclude that there was an unusually high incidence (approximately 5%) of gastric carcinoma in ulcer patients who had gastritis and inflammation of the anastomosis after gastrectomy as the incidence of gastric cancer in the general population is only 0.09%.

1104 EFFECT OF VAGOTOMY ON SECRETIN RELEASE IN MAN.

(Eng.) Ward, A. S.; Bloom, S. R. (Sheffield Royal Infirmary, London, England). *Gut* 16(12):951-956; 1975.

The release of secretin by intraduodenal acid was measured by a highly sensitive radioimmunoassay in 12 normal subjects, 23 duodenal ulcer patients, and 14 vagotomized patients (6 after truncal vagotomy and pyloroplasty, 4 after selective vagotomy and pyloroplasty, and 4 after highly selective vagotomy). A highly significant response occurred in all three groups. There was no significant difference between the groups in the magnitude or timing of this response. However, the absolute values for prestimulation and peak secretin were significantly smaller in preoperative duodenal ulcer patients than in either the normal subjects or the vagotomized patients. The secretin response was similar after truncal, selective, and highly selective vagotomy. These results suggest that secretin release is not dependent on intact vagal innervation of the small intestine in man.

1105 VAGOTOMY--A PROSPECTIVE, RANDOMIZED STUDY. (Eng.) Bombeck, C. T.; Condon, R. E.; Nyhus, L. M. (Abraham Lincoln Sch. Medicine, P.O. Box 6998, Chicago, IL 60680). *J. Surg. Oncol.* 7(5):411-414; 1975.

A prospective randomized study of three operations for duodenal ulcer; parietal cell vagotomy alone (without drainage), selective vagotomy with antrectomy, and truncal vagotomy with antrectomy, was conducted. All patients in the study were followed for at least 1 yr and, despite the small number of patients, there was a statistically significant return of gastric secretory activity to preoperative levels in the parietal cell vagotomy group, while both other groups maintained decreased acid secretion at the 1-yr period. There was one recurrent ulcer and one other suspected ulcer in the parietal cell vagotomy group, while both other groups had no ulcer recurrence even though morbidity was higher. This preliminary evaluation suggests strongly that extreme caution be used in applying parietal cell vagotomy alone as a definitive operation for duodenal ulcer.

1106 THE EFFECTS OF HIGHLY SELECTIVE VAGOTOMY ON EXOCRINE PANCREATIC FUNCTION IN MAN. (Eng.) Lindskov, J.; Amtorp, O.; Larsen, H. R. (Bispebjerg Hosp., Bispebjerg Bakke 23, DK 2400 Copenhagen NV, Denmark). *Gastroenterology* 70(4): 545-549; 1976.

Exocrine pancreatic function was studied after meal stimulation and i.v. hormone stimulation with secretin and cholecystokinin in 10 patients with duodenal ulcers before, and 3-4 months after, highly selective vagotomy. Hormone stimulation was also performed in 10 healthy volunteers. Duodenal concentrations of bicarbonate and enzymes after meal stimulation were unaltered postoperatively; e.g., the concentrations of lipase, trypsin, and chymotrypsin were unaltered. The authors conclude that this test is unsuitable for the study of exocrine pancreatic function as no correction of aspirated volumes was possible. However, this correction was possible in the i.v. hormone studies. A gastroduodenal tube with a balloon to occlude the pyloric canal was used, and tracer was infused into the duodenum. Results of this study showed that patients with duodenal ulcer display an increased basal secretion volume and an increased trypsin output during hormone stimulation. After highly selective vagotomy, basal secretion volume fell, tending to normal, while the stimulated secretion volume and bicarbonate and enzyme output were unchanged.

1107 ALCOHOL TOLERANCE AFTER PROXIMAL GASTRIC VAGOTOMY. (Eng.) Moodie, A. F.; Royston, C. M. S.; Spencer, J. (Royal Postgraduate Medical Sch., London, England). *Gut* 16(12):966-967; 1975.

Alcohol tolerance was studied in 10 men after proximal gastric vagotomy (PGV), in 6 men after truncal vagotomy and antrectomy (TV + A), and in 6 normal subjects. An oral alcohol tolerance test, in which the subjects consumed 0.65 g/kg absolute alcohol, was performed before surgery and 4 months after surgery. Alcohol tolerance curves of the control, PGV, and TV + A groups before surgery were similar. The PGV group showed no difference between pre- and postoperative tests. After the TV + A, the peak blood alcohol level achieved was significantly higher than before surgery ($p<0.005$ at 15 min and 20 min) and occurred earlier (at 15 min as compared with 40 min). This early peak fell quickly and returned to the preoperative level within 50 min. The authors suggest that PGV has an advantage over other operations for duodenal ulcer as far as alcohol tolerance is concerned.

1108 POSTPRANDIAL OSMOTIC AND FLUID CHANGES IN THE UPPER JEJUNUM AFTER TRUNCAL VAGOTOMY AND DRAINAGE IN MAN. (Eng.) Temple, J. G.; Birch, A.; Shields, R. (Hope Hosp., Salford, England). *Gut* 16(12):957-960; 1975.

Studies were undertaken to determine whether the upper jejunum receives osmotically irritating fluid after truncal vagotomy and drainage, and the relation of this phenomenon to post vagotomy diarrhea. The osmotic pressure and nonabsorbable marker dilution occurring in the upper jejunal lumen after ingestion of a hyperosmotic, EDTA-containing meal were measured in 30 patients after vagotomy and in 13 subjects with no previous gastric operation. Thirteen of the former group had diarrhea at least 3 months after operation. There were no significant differences between the osmolalities measured in any of the patients with or without diarrhea after vagotomy, and concentrations of ^{51}Cr-EDTA were similar to the group without surgery. It is concluded that when diarrhea is encountered after truncal vagotomy and drainage, it is not due to a vast outpouring of fluid into the jejunal lumen in response to the emptying of osmotically irritating fluid into the upper small bowel.

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1140 EFFECTS OF LONG-TERM TREATMENT WITH METIAMIDE. (Eng.) Thjodleifsson, B.; Wormsley, K. G. (Dept. Therapeutics, Univ. Dundee, Dundee, Scotland). *Digestion* 12(3):134-143; 1975.

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1142 THE ASSOCIATION OF A BLEEDING DUODENAL ULCER WITH AN ULCERATED BLEEDING DUODENAL DIVERTICULUM. (Rus.) Melnik, L. A. (Crimean Medical Inst., Simferopol, USSR). *Khirurgiia (Mosk.)* (6):121-122; 1975.

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See also, 0865, 0990, 1072, 1146, 1167, 1172, 1181, 1449, 1481, 1551.

SMALL INTESTINE

1144 ANGIOGRAPHIC EVALUATION OF CARCINOID TUMORS OF THE SMALL INTESTINE: THE VALUE OF EPINEPHRINE. (Eng.) Goldstein, H. M.; Miller, M. (M.D. Anderson Hosp., Univ. Texas System Cancer Center, Houston, TX 77025). *Radiology* 114(1):23-28; 1975.

Angiographic findings in five cases (three women and two men) of histologically proven carcinoid tumors of the ileum are discussed. In the two cases in which epinephrine (12-16 µg) was injected, tumor staining of the primary lesions and their hepatic metastases was markedly enhanced. The findings

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included irregularity and narrowing of the distal mesenteric and intestinal arcade arterial branches, minimal parenchymal stain, and obstructed venous return. A stellate arterial configuration was not seen. Small i.v. doses of epinephrine or other pressor amines accentuate or produce flushing in patients suspected of having small intestinal carcinoid tumors. This effect may be a result of the injected epinephrine circulating to the tumor and stimulating the formation of a flush-provoking humoral substance (i.e., kallikrein or bradykinin). The authors suggest that the possible pharmacoangiographic mechanism of epinephrine may be analogous to the use of secretin and other hormonal pancreatic stimulants to augment pancreatic angiography.

1145 ENTEROKINASE AND TRYPSIN ACTIVITIES IN PANCREATIC INSUFFICIENCY AND DISEASES OF THE SMALL INTESTINE.

(Eng.) Lebenthal, E.; Antonowicz, I.; Schwachman, H. (Harvard Medical Sch., Boston, MA). *Gastroenterology* 70(4):508-512; 1976.

The activities of mucosal and intraluminal enterokinase, trypsin activity, and disaccharidase activities were compared in 133 infants with a variety of gastrointestinal and pancreatic disorders, and the results were correlated with the morphological appearance of the intestinal mucosa. In addition, two patients with congenital enterokinase deficiency are described. Fourteen patients with diarrhea and grade II mucosal injury revealed a significant reduction of enterokinase, trypsin, and disaccharidase activities as compared to 59 children with normal mucosa. Nine patients with cystic fibrosis and pancreatic insufficiency had normal mucosal enterokinase activity and elevated intraluminal enterokinase activity with very low or no trypsin activity. Patients with hypoproteinemia and gastrointestinal protein loss, associated with intestinal lymphangiectasia (four patients) and intestinal lymphoid nodular hyperplasia (three patients), had normal or insignificant decrease of enterokinase and trypsin activities. In patients with steatorrhea, a normal sweat test, normal intestinal mucosa, and absent trypsin activity, two entities were defined. One group (three patients) was diagnosed as Shwachman-Diamond syndrome with pancreatic insufficiency and normal mucosal and intraluminal enterokinase activity. The second group (two patients) with absent mucosal and intraluminal enterokinase activity and normal lipase and amylase activities was diagnosed as congenital enterokinase deficiency. The results indicate a reduction in enterokinase activity that parallels the degree of intestinal mucosal injury and the decrease in disaccharidase activities.

1146 PROXIMAL JEJUNAL REVERSAL PROCEDURE WITHOUT INTERPOSITION FOR MANAGEMENT OF DUMPING SYNDROME.

(Eng.) Chang, T. H.; Myers, H. C. (Broaddus Hosp., Philippi, WV). *Am. Surg.* 41(10):632-639; 1975.

A new surgical procedure, proximal jejunal reversal based on a modified Roux-en-Y without interposition of the jejunal loop, for control of disabling dumping syndrome is described, and its application in three cases is reported. A 72-yr-old woman underwent a 75% gastrectomy for a large gastric ulcer. After gastrojejunostomy, a side-to-side anastomosis was made between the afferent and efferent jejunal loops 10 cm from the gastrojejunal junction, and the efferent loop was then obliterated by suture. Postoperatively, there were no dumping symptoms and a gastrointestinal series revealed slow emptying of the gastric pouch and slow intestinal transit. A bilateral truncal vagotomy and hemigastrectomy with the proximal jejunal reversal procedure were carried out in a 46-yr-old woman for duodenal and pyloric ulcer. The reversed segment measured 10 cm. Four weeks postoperatively, barium studies revealed slow evacuation of the gastric pouch and slow transit of the media. Two yr after a pyloroplasty and bilateral truncal vagotomy for a long-standing duodenal ulcer, a hemigastrectomy with gastrojejunostomy and proximal jejunal reversal were performed for recurrent duodenal ulcer in a 41-yr-old woman. Postoperatively, a gastrointestinal series revealed slow evacuation of the gastric pouch and delayed transit of barium throughout the small intestine. The advantages of this new procedure appear to reside in its simplicity and broad applicability

1147 RECURRENT PNEUMOPERITONEUM DUE TO JEJUNAL DIVERTICULOSIS: WITH A REVIEW OF THE CAUSES OF SPONTANEOUS PNEUMOPERITONEUM.

(Eng.) Wright, F. W.; Lumsden, K. (Churchill Hosp., Oxford OX3 7LJ, England). *Clin. Radiol.* 26(3):327-331; 1975.

A case of recurrent spontaneous pneumoperitoneum due to jejunal diverticulosis in a 72-yr-old man is presented. Symptomless spontaneous pneumoperitoneum is uncommon in the absence of abdominal operative procedures. He presented with a 4-week history of acute pain in the right upper abdomen, associated with abdominal distension. Plain abdominal and chest films showed free gas in the peritoneal cavity and distension of the small bowel. Barium studies revealed multiple large diverticula in the jejunum, and sigmoidoscopy was negative. Serum folic acid was 2.7 x 10^{-9} g/ml, B_{12} was 130 x 10^{-12} g/ml, and fecal fat was elevated. Chemical findings suggested bacterial colonization of the diverticula. Treatment with tetracycline resulted in subjective improvement, and following monthly vitamin B_{12} injections, his stools became firmer and fecal fat decreased. Two further episodes of abdominal pain and radiographic evidence of air in the peritoneal cavity occurred 7 and 17 months after the initial episode, but when seen after 20 months he was feeling well, had a good appetite, had 1-2 stools per day, and had normal chemistries. Six other cases of jejunal diverticulosis with pneumoperitoneum are briefly summarized. Other causes of symptomless pneumoperitoneum include pneumatosis intestinalis, perforation in tabes dorsalis or coma, stercoral ulceration, physiological pneumoperitoneum in women due to exercise in the knee-elbow position, and vaginal douches with a bulb syringe or effervescent fluid.

148 JEJUNAL MORPHOLOGY AND MUCOSAL ENZYME ACTIVITY FOLLOWING INTESTINAL SHUNT OPERATION OR OBESITY. (Eng.) Dano, P.; Nielsen, O.; Petri, .; Jorgensen, B. (Rigshospitalet, Copenhagen, Denark). *Scand. J. Gastroenterol.* 11(2):129-134; 1976.

illous morphology and enzyme activity in the jejunal ucosa were investigated in 33 patients following inestinal shunt operation for obesity. Jejunal biopies were obtained p.o. with a Rubin capsule before nd on an average of 17 months after operation. he shunt left 48 cm of functioning intestine with arious jejunum/ileum ratios. Biopsies revealed a ignificant decrease in protein content from 10.3% efore operation to 5.9% after operation. There was statistically significant increase in alkaline hosphatase, and there was no change in surface area r volume of the villi. It is concluded that weight tabilization observed after this operation is due o adaptive compensation in the ileal remnant.

149 CERTAIN METABOLIC CONSEQUENCES OF JEJUNOILEAL BYPASS. (Eng.) Bendezu, R.; Wieand, R. G.; Green, S. G.; Hallberg, M. C.; Marsters, . W. (St. Luke's Hosp., Cleveland, OH 44104). *Am. . Clin. Nutr.* 29(4):366-370; 1976.

wenty-nine patients were evaluated for possible etabolic alterations after jejunoileal bypass. here was a rapid weight loss during the immediate ostoperative period, associated with a hypercataolic state. Afterward, a more gradual and sustained oss occurred, with a tendency to plateau. Twelve onths after the operation, the average weight loss as 32.2%. Significant decreases in serum cholesterol, serum triglycerides, blood sugar after a gluose load, and fasting plasma insulin levels were oted. Increased oxalate excretion and occasional pisodes of hypomagnesemia also occurred. It is ecommended that this surgical procedure be regarded s palliative, individual, and experimental.

150 EARLY CHANGES IN THE SERUM ACTIVITY OF ORNITHINE CARBAMOYL TRANSFERASE IN PAIENTS OPERATED ON WITH A JEJUNO-ILEAL BY-PASS FOR XTREME OBESITY. (Eng.) Lundstrom, B.; Gillquist, . (Univ. Hosp., Linkoping, Sweden). *Acta Chir. cand.* 141(8):786-789; 1975.

erum activity of ornithine-carbamoyl-transferase S-OCT) was monitored in 13 patients who underwent ejuno-ileal shunting for extreme obesity. Blood amples were taken before and immediately after urgery, and then at 2, 4, 6, 8, 12, 18 and 24 hr fter surgery. A rapid rise in the S-OCT occurred nd was observed at its peak between 2 and 8 hr after he operation. In four patients operated on for inestinal diseases, much smaller rises in the S-OCT ere noted. In a control group of six patients perated on for knee injuries, no changes of the -OCT were noted after operation. The rise in the -OCT is interpreted as a sign of liver cell damage f unknown cause in the patients with jejuno-ileal hunting.

1151 EFFECTS OF ORAL VERSUS INTRAVENOUS NUTRITION ON INTESTINAL ADAPTATION AFTER SMALL BOWEL RESECTION IN THE DOG. (Eng.) Feldman, E. J.; Dowling, R. H.; McNaughton, J.; Peters, T. J. (Royal Postgraduate Medical Sch., London, England). *Gastroenterology* 70(5):712-719; 1976.

The influence of luminal nutrition on the structural and functional adaptive changes in the residual intestine, after partial small bowel resection, was studied. Quantitative histology, *in vitro* uptake of ^{14}C *l*-leucine, mucosal enzyme activities, and *in vivo* absorption of glucose were studied before and 6 weeks after 50% proximal small bowel resection in 10 greyhound dogs (5 were nourished i.v. and 5 were pair-fed by mouth). In the p.o. fed jejunectomized dogs, the ileum became dilated with mucosal hyperplasia, the villus height increased from 796 µm to 1102 µm, and there was a corresponding increase in glucose absorption *in vivo* from 5.3 to 10.1. The increased absorption was apparently caused by the dilation and villus hyperplasia, since there was no significant change in *in vitro* absorption and mucosal enzyme activity when expressed per unit weight of intestine. In the absence of exogenous luminal nutrition, the well nourished i.v. fed dogs showed no evidence of functional adaptation and a significant fall in mean ileal villus height from 823 µm at the initial operation to 732 µm 6 weeks after jejunectomy. These results provide evidence that luminal nutrition is essential for the development of intestinal adaptation after resection and suggest that luminal contents are necessary to maintain the structural and functional integrity of the normal small bowel.

1152 STUDIES ON SMALL INTESTINAL OBSTRUCTION. VI. BLOOD CIRCULATION IN MODERATELY DISTENDED SMALL BOWEL AFTER OBSTRUCTION. (Eng.) Ohman, U. (Karolinska Sjukhuset, Stockholm, Sweden). *Acta Chir. Scand.* 141(8):771-779; 1975.

Feline small bowel circulation was studied during *in vitro* homologous perfusion of denervated intestine after *in vivo* obstruction. The bowel specimens showed delayed compliance and, when compared with nonobstructed specimens, they showed enhanced distensibility. Bowel specimens investigated during continuous distension had a normal regional vascular resistance and a normal capillary filtration coefficient (CFC) but a somewhat decreased oxygen utilization; artificial distension to 20 mm HG caused a resistance enhancement and a profound (80-90%) reduction of CFC but did not prevent oxygen consumption from attaining normal levels. Bowel specimens investigated after intra-operative decompression showed normal vascular resistance, normal CFC, and normal oxygen consumption; artificial distension to 20 mm Hg produced a resistance enhancement and a moderate (40-50%) reduction of CFC; oxygen consumption was not affected. After release of the distension, flow reduction and resistance enhancement persisted, whereas CFC returned to basal values in both groups of specimens; oxygen consumption remained on stable levels. It is emphasized that the persisting augmentation of resistance observed after decompression of the bowel was re-

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lated to the *in vitro* situation, whereas *in vivo* intra-operative decompression of obstructed bowel seemed to involve no consequences of this kind. Some experiments demonstrated fluid output to the gut lumen in the postdistension period. It is concluded that a simple small bowel obstruction, although not involving any serious threat to the bowel viability, renders the gut wall vulnerable to any further increment of distension or ischemia. It is suggested that this is mainly the result of enhanced distensibility in the wall of the obstructed gut.

1153 STUDIES ON SMALL INTESTINAL OBSTRUCTION. V. BLOOD CIRCULATION IN MODERATELY DISTENDED SMALL BOWEL. (Eng.) Ohman, U. (Karolinska Sjukhuset, Stockholm, Sweden). *Acta Chir. Scand.* 141(8):763-770; 1975.

Feline small bowel circulation was studied for a 60-min period during *in vitro* homologous perfusion of denervated intestine, upon artificial distension to 20 mm Hg. Delayed compliance was observed, and distension evoked contractile bowel activity; each bowel contraction was accompanied by a decrease in blood flow rate, whereas bowel relaxations coincided with augmentations of flow. Artificial distension diminished blood flow, denoting a 50-60% increase of regional vascular resistance. Artificial distension elicited variable capillary filtration coefficient (CFC) responses (on the average a 45-50% reduction of the perfused capillary surface area), but it did not affect the oxygen consumption rate. After release of the distension, the enhancement of vascular resistance persisted and even increased, whereas CFC returned to control level. Control experiments involving homologous perfusion but no artificial distension also demonstrated some resistance augmentation and CFC reduction. Although the experimental procedure may occasion some degree of hemodynamic impairment, the present observations and previous reports suggest that bowel viability is not significantly affected. It is concluded that a sustained and moderate distension of non-obstructed feline small bowel, perfused *in vitro*, involves no threat to the microcirculation or to the viability of the bowel.

1154 ESOPHAGEAL MOTOR DYSFUNCTION IN IDIOPATHIC INTESTINAL PSEUDOOBSTRUCTION. (Eng.) Schuffler, M. D.; Pope, C. E., II. (Univ. Washington Sch. Medicine, Seattle, WA). *Gastroenterology* 70(5):677-682; 1976.

Five patients with idiopathic intestinal pseudo-obstruction (IIP) were studied with esophageal manometry to determine if the esophagus is commonly involved in IIP. All patients had abnormalities of esophageal motility. In two, primary peristalsis was replaced by simultaneous contractions; repetitive spontaneous activity was marked. The lower esophageal sphincter failed to relax and the Mecholyl test was positive in both. In the other three, primary peristalsis was absent, low amplitude simultaneous waves followed swallows, no spontaneous activity was present, and defects in lower esophageal sphincter relaxation were found in two. The Mecholyl test was negative in the one patient tested. The results indicate that the esophagus is abnormal in idiopathic intestinal pseudo-obstruction, and may prove useful as an organ for diagnostic study in these patients.

1155 MODERN DIAGNOSIS OF THE SMALL INTESTINE IN MEDICAL PRACTICE. (Ger.) Volkheimer, G. (Bayerischer Platz 9, D-1 Berlin 62, Germany). *Wien. Med. Wochenschr.* 125(37):518-520; 1975.

1156 BIOLOGICAL AND PATHOGENIC FINDINGS IN ALPHA-CHAIN DISEASE. (Fre.) Seligmann, M. (No affiliation given). *J. Med. Liban* 28(2):203-212; 1975.

1157 MANIFESTATIONS OF INTESTINAL ISCHEMIA CAUSED BY GASTROINTESTINAL CARCINOIDS: SEVEN CASES. (Fre.) Colin, R.; Hemet, J.; Metayer, J.; Chleq, C.; Geffroy, Y. (No affiliation given). *Arch. Fr. Mal. App. Dig.* 64(3):279-280; 1975.

1158 LYMPHOSARCOMA OF THE SMALL INTESTINE DIAGNOSED AT EXPLORATORY LAPAROTOMY FOLLOWING THE FAILURE OF SELECTIVE ARTERIOGRAPHY. (Fre.) Roux, M.; Delavierre, Ph.; Laffitte, Ph.; Cornet, A. (Hopital de Vaugirard, 389, rue de Vaugirard, 75015, Paris, France). *Sem. Hop. Paris* 51(23):1559-1562; 1975.

1159 INTESTINAL TUMORS AS A CAUSE OF OBSCURE FEVERS IN CHILDREN. (Pol.) Sroczynska, M.; Karczewska, K.; Sonta-Jakimczyk, D.; Romanski, A.; Wawryk, R. (Silesian Acad. Medicine, ul. 3 Maja 13/15, 41-800 Zabrze, Poland). *Pediatr. Pol.* 50(7):905-909; 1975.

1160 INFILTRATING FORM OF LYMPHOSARCOMA IN THE SMALL INTESTINE. (Fre.) Chatelin, C.-L.; Rouison, D.; Lasserre, M. (Centre Hospitalier Princesse Grace, Monaco). *Sem. Hop. Paris* 51(23):1563-1564; 1975.

1161 THE SURGEON CONFRONTED WITH PRIMARY GASTROINTESTINAL LYMPHOMA. (Fre.) Ghossain, A. (No affiliation given). *J. Med. Liban.* 28(2):259-264; 1975.

1162 THE CLINICAL CLASSIFICATION AND THE COURSE OF INTESTINAL LYMPHOMAS. (Fre.) Rambaud, J. C.; Tursz, T.; Matuchansky, C. (Hopital St.-Lazare, 107, rue du Faubourg Saint Denis, 75010 Paris, France). *J. Med. Liban.* 28(2):193-201; 1975.

1163 NEUROFIBROMA OF THE SMALL INTESTINE. (Rus.) Sutiagin, A. G.; Stakhanov, M. L.; ipchenko, L. A. (Moscow Scientific Res. Inst. Roentgenology Radiology, USSR). *Khirurgiia (Mosk.)* (8):115-116; 1975.

1164 SURGICAL TREATMENT OF OBESITY. (Pol.) Goral, R.; Tuszewski, M. (Kliniki Chirurgii Gastroenterologicznej Instytutu Chirurgii AM w Poznaniu, Poland). *Pol. Przegl. Chir.* 47(5): 621-629; 1975.

1165 LONG-TERM RESULTS OF SUBTOTAL RESECTION OF THE SMALL INTESTINE. (Rus.) Belov, S. I. (Shuiskii Central Regional Hosp., Ivanovo Region, USSR). *Khirurgiia (Mosk.)* (7):109; 1975.

1166 ENDOGENOUS ETHANOL PRODUCTION AND HEPATIC DISEASE FOLLOWING JEJUNOILEAL BYPASS FOR MORBID OBESITY. (Eng.) Mezey, E.; Imbembo, A. L.; Potter, J. J.; Rent, K. C.; Lombardo, R.; Holt, P. R. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD). *Am. J. Clin. Nutr.* 28(11):1277-1283; 1975.

1167 REESTABLISHING DUODENAL CONTINUITY AFTER PREVIOUS GASTRECTOMY FOR PEPTIC ULCER. (Eng.) Parneix, M.; Lotte, P. (Hopital Saint Andre, 1 rue J. Burguet, Bordeaux 33075, France). *Int. Surg.* 60(10):521-523; 1975.

1168 DUODENOTOMY DEFECT. (Eng.) Kim, S. K.; Proto, A. V. (State Univ. Hosp., Syracuse, NY). *Br. J. Radiol.* 48(574):811-813; 1975.

1169 A RARE BUT CHARACTERISTIC RADIOLOGICAL IMAGE: INTRALUMINAL DIVERTICULUM OF THE DUODENUM. (Fre.) Debray, Ch.; Leymarios, J. (Hopital Bichat, 170 bd Ney, 75877 Paris Cedex 18, France). *Entretiens Bichat Med.* 1974:77-80.

1170 ERRORS IN THE DIAGNOSIS AND MANAGEMENT OF ACUTE COMPLICATIONS OF MECKEL'S DIVERTICULUM. (Rus.) Akzhigitov, G. N.; Khoroshkevich, G. V. (Volgograd Medical Inst., USSR). *Khirurgiia (Mosk.)* (8):101-106; 1975.

1171 MANIFESTATIONS OF MECKEL'S DIVERTICULUM. (Spa.) Ocana Losa, J. M.; del Carmen Garcia Valles, M.; Lopez Alonso, M. (Hospital Infantil, Seguridad Social "Virgen Rocio," Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 46(1):25-36; 1975.

1172 INTESTINAL ISCHEMIA IN THE ABSENCE OF VASCULAR OBSTRUCTIONS. (Fre.) Bodin, F.; Lichtenstein, H.; Fouet, P.; Conte, M. (Hopital St.-Antoine, 184, rue du Fg Saint-Antoine, 75571 Paris Cedex 12, France). *Entretiens Bichat Med.* 1974:41-46.

1173 SERUM PARAMETERS FOR OBSTRUCTIVE ILEUS OF THE PROXIMAL SMALL INTESTINE (EXPERIMENTAL STUDY). (Ger.) Willmen, H. R.; Kogel, H.; Karhoff, B.; Kley, R. (Medizinische Fakultat, RWTH, Aachen, BRD-51 Aachen, Goethestr. 27-29, Germany). *Zentralbl. Chir.* 100(10):608-617; 1975.

1174 SYMPTOMS OF ACUTE INTESTINAL OBSTRUCTION CAUSED BY ADHESIONS. (Rus.) Titov, B. M. (12th Municipal Clinical Hosp., Kazan, USSR). *Klin. Khir.* (8):46-47; 1975.

1175 STRANGULATION OF THE SMALL INTESTINE AT THE LIGAMENT OF TREITZ IN A PATIENT WITH MALROTATION OF THE LARGE INTESTINE. (Rus.) Borukhovskii, A. Sh. (Yakhromsk Municipal Hosp., Moscow Region, USSR). *Vestn. Khir.* 115(7):142-143; 1975.

1176 CLINICAL EVIDENCE OF INTESTINAL ABSORPTION OF GASTROGRAPHY. (Eng.) Poole, C. A.; Rowe, M. I. (Univ. Miami Sch. Medicine, P.O. Box 520875, Biscayne Annex, Miami, FL 33152). *Radiology* 118(1):151-153; 1976.

1177 ERRORS IN THE TREATMENT OF PATIENTS WITH INTESTINAL FISTULAS. (Rus.) Terentev, V. A. (Gorky Medical Inst., USSR). *Khirurgiia (Mosk.)* (6):110-113; 1975.

1178 MULTICHAMBERED CYST OF THE ILEUM CAUSED BY VOLVULUS OF THE SMALL INTESTINE. (Rus.) Peterchuk, F. T. (Grechana Station Hosp., Southwest Railroad, USSR). *Klin. Khir.* (7):72; 1975.

1179 ERRORS IN THE DIAGNOSIS AND TREATMENT OF PATIENTS WITH STRANGULATED ABDOMINAL HERNIAS. (Rus.) Kozlov, I. Z.; Androsova, T. P. (I. M. Sechenov 1st Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (6):106-110; 1975.

1180 A CASE OF REGIONAL ILEITIS RESULTING FROM AN ALLERGY. (Rus.) Teregeria, N. I. (Achinsk Regional Hosp., Eastern Siberian Railroad, USSR). *Klin. Khir.* (7):71; 1975.

1181 ULCERATIVE STENOSIS OF THE SMALL INTESTINE FOLLOWING PROLONGED INGESTION OF POTASSIUM CHLORIDE IN A SUBJECT WITH HYPOKALEMIC PERIODIC FAMILIAL PARALYSIS. (Fre.) Terrasse, J.; Lataix, J.; Moinade, S.; Boscher, J. (Hopital Saint-Jacques, F 6300 Clermont-Ferrand, France). *Ann. Med. Interne* 126(10):681-686; 1975.

See also, 0772, 0968, 0979, 0982, 0989, 0990, 1018, 1039, 1057, 1061, 1081, 1104, 1107, 1109, 1142, 1186, 1187, 1188, 1198, 1202, 1204, 1233, 1254, 1297, 1419, 1429, 1433, 1449, 1475, 1478, 1484, 1495, 1497.

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SMALL INTESTINE

Malabsorption

1182 SMALL INTESTINAL BIOPSY IN CHILDHOOD COELIAC DISEASE. (Eng.) Risdon, R. A.; Wadbrook, D. G.; Meinhard, E. A.; Keeling, J. W. (Hosp. Sick Children, Great Ormond St., London WC1N 3JH, England). *Postgrad. Med. J.* 51(600):716-721; 1975.

Small intestinal biopsies from children with treated and untreated celiac disease were analyzed morphometrically and compared to 37 healthy controls. A total of 113 jejunal biopsies from 90 children (including 30 children with celiac disease) was examined by a technique that provided indices of surface-to-volume ratio and of mucosal volume. Biopsies from 26 untreated celiacs and controls were analyzed by a technique that involves tracing the microscopic image of the biopsy onto computer data cards to produce measured, encoded data for direct computer analysis. Biopsies from untreated celiacs were clearly distinquished from the control specimens by both methods. Computer card morphometry showed that the mucosal lesion in celiac disease was associated with a spatial redistribution of the tissue components rather than a change in their absolute amounts. No difference in total mucosa volume was found, indicating that a true mucosal atrophy does not occur in celiac disease. Surface-to-volume ratios were measured before and after gluten challenge in 23 children treated empirically with a gluten-free diet for 2 yr for suspected celiac disease. The diagnosis of celiac disease was confirmed in 16 of these patients. In morphologically normal biopsies, correlation of surface-to-volume ratios with age showed significantly smaller values in younger children. It is concluded that slight changes in biopsies from young children should be interpreted cautiously and should not necessarily be regarded as pathological on the evidence of the villous pattern alone.

1183 THE COEXISTENCE OF CYSTIC FIBROSIS AND CELIAC DISEASE. (Eng.) Katz, A. J.; Falchuk, Z. M.; Shwachman, H. (Harvard Medical Sch., 300 Longwood Ave., Boston, MA 02115). *Pediatrics* 57(5):715-721; 1976.

Studies were undertaken to determine whether duodenal mucosa obtained from each of two patients with cystic fibrosis (CF) who subsequently developed celiac disease (CD) and their immediate families differed in organ culture behavior from mucosa obtained from patients with CD alone. In addition, HL-A typing was used to determine whether the two patients with CF-CD differed genetically from patients with CD alone. One patient was HL-A8, the most common type associated with CD; the other was HL-A12, as are many of the non-HL-A8 celiac patients. The response in organ culture of the mucosa of these two patients was the same as the response in organ culture of the mucosa from patients with CD alone. These and previous data suggest that CD occurring in patients with CF is no different than CD occurring alone.

1184 MESENTERIC ANGIOGRAPHY OF NON-TROPICAL SPRUE. (Eng.) Cynn, W. -S.; Herasme, V. M.; Levin, B. L.; Gureghian, P. A.; Schreiber, M. N. (Graduate Hosp. Univ. Pennsylvania, Philadelphia, PA 19146). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(2):442-446; 1975.

Mesenteric angiographic findings in two men with nontropical sprue are presented. Both cases were characterized by dilated superior mesenteric artery and vein, increased, but patchy, blush of the small bowel wall, and early and good opacification of veins. The similarity of these angiographic findings with those found in pharmacoangiography with vasodilators suggests that the diffuse capillary blush of the small bowel may be caused either by vasodilation secondary to the disease itself or to increased demand for blood. An allergic or toxic aspect of nontropical sprue might be responsible for the capillary dilatation. Mesenteric angiography may be helpful for the evaluation of the malabsorption syndrome, especially in cases where it is important to eliminate the possibility of a tumor.

1185 TETANY, MALABSORPTION, AND MASTOCYTOSIS. (Eng.) Dantzig, P. I. (Albany Medical Center, Albany, NY 12208). *Arch. Intern. Med.* 135(11):1514-1518; 1975.

Two patients, a 44-yr-old and a 20-yr-old woman, with systemic mastocytosis, tetany, and malabsorption were studied during periods of diarrhea and normal gastrointestinal function to determine the nature of the malabsorption and tetany. Both patients had symptoms of pruritus, flushing, tachycardia, diarrhea, weakness, and abdominal pain. Laboratory tests revealed flat glucose and lactose tolerance curves, low D-xylose absorption, low serum carotene, low serum calcium, and low serum iron levels when the patients were studied without diarrhea. These tests suggested abnormal jejunal functions. Serum magnesium and protrombin time levels used as a measure of vitamin K absorption, were normal between bouts of diarrhea. A Schilling test in each patient was normal, indicating at least partial retainment of absorptive function. All indicators of absorption, including electrolytes, minerals, fats, proteins, and vitamins worsened with diarrhea. Small intestinal biopsies showed infiltration of the lamina propria and submucosa by mast cells, and gastrointestinal x-ray films showed nodular densities, edema, and thickening of the intestinal wall. Tetany was due in part to combined hypocalcemia, hypomagnesemia, and hypokalemia. Diarrhea and malabsorption were due to mast cell infiltration of the small intestine rather than to histamine. It is concluded that patients with signs of systemic mastocytosis should be followed carefully to prevent the development of malabsorption and tetany.

1186 THE USE OF MEDIUM-CHAIN TRIGLYCERIDE IN CHILDREN WITH INTESTINAL MALABSORPTION. (Eng.) Gracey, M. (Princess Margaret Children's Medical Res. Foundation, Perth, Western Australia). *Paediatr. Indones.* 14(7/8):113-117; 1974.

1187 INFLUENCE OF DIFFERENT TYPES OF ANASTOMOSIS ON INTESTINAL MOTILITY, FLORA AND ABSORPTION. (Eng.) Nygaard, K. (Rikshospitalet, Kirurgist avdeling B, Universitetsklinikk, Oslo, Norway). *Chir. Gastroenterol.* 9(1):57-59; 1975.

1188 MALABSORPTION FOLLOWING GASTROENTEROSTOMY AND DUODENAL DIVERTICULA. (Eng.) Findlay, J. M.; Campbell, I. W.; Munro, J. F. (Western General Hosp., Edinburgh, Scotland). *J. R. Coll. Surg. Edinb.* 20(2):122-123; 1975.

1189 DILUTE ELEMENTAL DIET AND CONTINUOUS INFUSION TECHNIQUE FOR MANAGEMENT OF SHORT BOWEL SYNDROME. (Eng.) Christie, D. L.; Ament, M. E. (Sch. Medicine, Univ. California, Los Angeles, CA 90024). *J. Pediatr.* 87(5):705-708; 1975.

1190 EXTERNAL MEASUREMENT OF ^{47}Ca ABSORPTION. (Ger.) Kocian, J.; Brodan, V. (Inst. Postgraduate Medicine, Praha 4, Budejovicka 800, Czechoslovakia). *Isotopenpraxis* 11(8):287-289; 1975.

1191 FRACTIONAL INTESTINAL ABSORPTION AND RETENTION OF CALCIUM MEASURED BY WHOLE-BODY COUNTING: APPLICATION OF A POWER FUNCTION MODEL. (Eng.) Nielsen, S. P.; Barenholdt, O.; Munck, O. (Glostrup Hosp., Glostrup, Denmark). *Scand. J. Clin. Lab. Invest.* 35(3):197-203; 1975.

1192 INTESTINAL MALABSORPTION SYNDROME IN IRON DEFICIENCY ANEMIAS. (Spa.) Mendez Aparicio, F. M. (Hospital Infantil, Madrid, Spain). *Hosp. Gen.* 14(6):495-506; 1974.

1193 INTESTINAL MALABSORPTION OF IRON. (Eng.) Halpin, T. C.; Ament, M. E. (Sch. Medicine, Univ. California, CA 90024). *J. Pediatr.* 88(5):911-912; 1976.

1194 CONGENITAL AND ADULT INTESTINAL LACTASE DEFICIENCY. (Eng.) Gray, G. M. (Sch. Medicine, Stanford Univ., Stanford, CA 94305). *N. Engl. J. Med.* 294(19):1057-1058; 1976.

1195 LACTOSE MALABSORPTION: ITS BIOLOGY AND HISTORY. (Eng.) Johnson, J. D.; Kretchmer, N.; Simoons, F. J. (Stanford Univ. Sch. Medicine, Stanford, CA). *J. Pediatr.* 21:197-239; 1974.

1196 INTERRELATIONSHIPS BETWEEN THE B-VITAMINS IN B$_{12}$-DEFICIENCY NEUROMYELOPATHY. A POSSIBLE MALABSORPTION-MALNUTRITION SYNDROME. (Eng.) Dastur, D. K.; Santhadevi, N.; Quadros, E. V.; Gagrat, B. M.; Wadia, N. H.; Desai, M. M.; Singhal, B. S.; Bharucha, E. P. (Postgraduate Res. Lab., J.J. Group Hosp., Bombay-8, India). *Am. J. Clin. Nutr.* 28(11):1255-1270; 1975.

1197 PROGRESSIVE MULTIFOCAL LEUKOENCEPHALOPATHY WITH 10-YEAR SURVIVAL IN A PATIENT WITH NONTROPICAL SPRUE: REPORT OF A CASE WITH UNUSUAL LIGHT AND ELECTRON MICROSCOPIC FEATURES. (Eng.) Kepes, J. J.; Chou, S. M.; Price, L. W., Jr. (Univ. Kansas Medical Center, Rainbow Blvd. at 39th, Kansas City, KS 66103). *Neurology* 25(11):1006-1012; 1975.

1198 ADENOCARCINOMA OF THE JEJUNUM ASSOCIATED WITH NONTROPICAL SPRUE. (Eng.) Petreshock, E. P.; Pessah, M.; Menachemi, E. (Long Island Jewish-Hillside Medical Center, New Hyde Park, NY 11040). *Am. J. Dig. Dis.* 20(8):796-802; 1975.

1199 OCCURRENCE OF CELIAC SPRUE IN A PATIENT WITH FABRY'S DISEASE. (Eng.) Halsted, C. H.; Rowe, J. W. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD 21205). *Ann. Int. Med.* 83(4):524-525; 1975.

1200 ABSORPTION OF PROPRANOLOL AND PRACTOLOL IN COELIAC DISEASE. (Eng.) Parsons, R. L.; Kaye, C. M.; Raymond, K.; Trounce, J. R.; Turner, P. (Guy's Hosp. Medical Sch., Saint Thomas' St., London SE1 9RT, England). *Gut* 17(2):139-143; 1976.

1201 COELIAC DISEASE WITH FARMERS' LUNG. (Eng.) Robinson, T. J. (Craigavon Area Hosp., Co Armagh, Northern Ireland). *Br. Med. J.* 1(6012):745-746; 1976.

1202 EOSINOPHILIC GASTROENTERITIS WITH MALABSORPTION, EXTENSIVE VILLOUS ATROPHY, RECURRENT HEMORRHAGE AND CHRONIC PULMONARY FIBROSIS. (Eng.) Thomas, E.; Lev, R.; McCahan, J. F.; Pitchumoni, C. S. (New York Medical Coll., New York, NY 10029). *Am. J. Med. Sci.* 269(2):259-265; 1975.

1203 LYMPHOGRAPHY IN WHIPPLE'S DISEASE. (Fre.) Fardou, H.; Lestrade, M.; Roulleau, J. (Hopital Purpan, 31300 Toulousse, France). *J. Radiol. Electrol. Med. Nucl.* 56(2):171-172; 1975.

See also, 0946, 0961, 0982, 1500, 1514.

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1204 ADENOVIRUS AND ILEOCECAL INTUSSUSCEPTION.

(Eng.) Yunis, E. J.; Atchison, R. W.; Michaels, R. H.; DeCicco, F. A. (Dept. Pathology, Univ. Pittsburgh, Pittsburgh, PA 15213). *Lab. Invest.* 33(4):347-351; 1975.

Tissue slides from 682 appendices removed from children operated on for ileocecal intussusception over a 4-yr period were examined retrospectively and prospectively by light and electron microscopy for the presence of adenovirus infection. Intranuclear inclusion bodies were found by light microscopy in epithelial cells in more than one-third of the specimens. Electron microscopy of hematoxylin and eosin-stained slides showed the intranuclear inclusion bodies to be composed of viral particles in large and small crystalline arrays. Adenovirus of serotypes 2, 3, and 5 were isolated from the five cases with inclusion in which isolation was attempted. The electron microscope demonstration of replicating adenovirus in appendiceal mucosa in 11 of 30 cases suggests a pathogenic role for adenovirus in those cases of intussusception in which intranuclear inclusion bodies are found in the epithelial cells of the appendix or terminal ileum.

1205 THE COLITIS OF BEHCET'S DISEASE: A CLINICAL-RADIOGRAPHIC CORRELATION.

(Eng.) Stanley, R. J.; Tedesco, F. J.; Melson, G. L.; Geisse, G.; Herold, S. L. (Washington Univ. Sch. Medicine, 510 S. Kingshighway, St. Louis, MO 63110). *Radiology* 114(3):603-604; 1975.

The radiographic, colonoscopic, and pathologic findings of colitis associated with Behcet's disease in a 34-yr-old woman are presented. The patient presenting with a 3-yr history of Behcet's disease developed profuse rectal bleeding on three occasions, which was only partially responsive to vasopressin; right colectomy was performed on the first occasion, and the remainder of the colon to the distal sigmoid was resected on the third occasion. Multiple discrete ulcers were present in the resected portions of colon. No tortuous arterioles, mucosal hyperemia, or early venous filling were encountered, using superior mesenteric arteriography. The results suggest that the radiographic and colonoscopic features of the colonic involvement in Behcet's disease may be quite specific when they are associated with other clinical manifestations of the disease. Radiographic discovery of multiple, well marginated ulcers similar to duodenal or gastric ulcers in an otherwise unremarkable-appearing colon should lead to inquiry concerning the presence of oral or genital ulcers or occular inflammatory disease.

1206 ISCHEMIC COLITIS AFTER ABDOMINOPERINEAL RESECTION.

(Eng.) Wittenberg, J.; O'Sullivan, P.; Williams, L., Jr. (Boston City Hosp., Boston Univ. Medical Center, Boston, MA). *Gastroenterology* 69(6):1321-1325; 1975.

Four cases of ischemic colitis occurring at intervals from 3 months to 7 yr after abdominoperineal resection for carcinoma of the distal colon are described. In three of the four patients, the predominant blood supply to the affected segment of colon was via the middle colic branch of the superior mesenteric artery, despite the presence of the inferior mesenteric artery. The lack of collateral circulation provided by the resected colon probably increases the risk of developing ischemic colitis in the remaining colon. The sparing of the distal colon and colostomy site in the four patients was paradoxical. A possible explanation is that collateral channels, not derived from the mesenteric circulation, were available. The authors hypothesize that during the ischemic attack, the vascular insult selectively affects the mesenteric arterial circulation and that the systemic circulation remains available for collateral flow to the distal colon.

1207 ANALYSIS OF CECAL VASCULATURE IN THE SEARCH FOR VASCULAR MALFORMATIONS.

(Eng.) Baer, J. W.; Ryan, S. (St. Luke's Hosp. Center, New York, NY). *Am. J. Roentgenol.* 126(2):394-405; 1976.

Four cases of vascular malformation of the cecum resulting in gastrointestinal bleeding, diagnosed angiographically, are described. In addition, the angiographic findings of 39 normal cecum specimens and the microscopic features of 26 normal postmortem cecum specimens were studied to establish the angioarchitecture of the cecum and to define the anatomy of the antimesenteric border where the majority of vascular malformations occur. The control study of autopsy and surgical specimens revealed that there was a 1:1 ratio of artery to vein at the antimesenteric border. There were many anastomoses along the mesenteric border between the vasa recta of opposite walls of the colon. Longitudinal anastomoses between parallel vasa recta distal to the antimesenteric taeniae ensure continuous perfusion of the bowel during peristalsis. Thus, vascular occlusion must occur on the small arteries of the submucosa or within the mesentery to produce ischemia of the bowel. Therefore, the anatomical venous changes observed in vascular malformations of the cecum can be acquired. The authors postulate that vascular malformations are the result of functional shunting. Barium enema examinations were negative in all four cases. In three of the four, early venous filling identified the cecal vascular malformation. The histologic appearance of these lesions was similar to the venous ectasia of acute localized hyperemia of bleeding diverticula and generalized venous engorgement associated with increased venous pressure. The authors conclude that diagnosis of vascular malformations of the cecum and ascending colon should be strongly suspected in patients between 40-85 yr of age presenting with chronic intermittent bleeding from the lower gastrointestinal tract together with a negative barium examination.

1208 MANOMETRIC ASSESSMENT OF CONTINENCE AFTER SURGERY FOR IMPERFORATE ANUS.

(Eng.) Arhan, P.; Faverdin, C.; Devroede, G.; Dubois, F.; Coupris, L.; Pellerin, D. (Faculte Necker-Enfants-

Malades, 156, Rue de Vaugirard, 75015, Paris, France). *J. Pediatr. Surg.* 11(2):157-166; 1976.

Rectal and anal sphincteric resting pressures were studied in 49 children at least 1 yr following surgery for imperforate anus. Twenty-three children underwent an abdominoperineal procedure for a high and 7 for a low malformation; 17 had a perineoplasty for a low and 2 for a high malformation. Of the 30 subjects who underwent an abdominoperineal procedure, 8 were continent in contrast to 15 out of 19 patients who had perineoplasty ($p<0.001$). In patients who underwent an abdominoperineal procedure, the rectal motility was of the colonic type, with waves of higher amplitude and lower frequency ($p<0.01$) than in the normal rectum in 23 cases and in most of these, peristalsis was recorded down to the anal margin. Incontinence was most frequently associated with abnormally short anal resistance, low anal pressure, reduced sensibility, weak voluntary contraction, and absence of recto-anal inhibitory reflex. In the group of patients who underwent perineoplasy, continence was associated with normal mechanical parameters and normal physiologic behavior of the anal sphincter.

1209 THE DEVELOPMENT OF ANORECTAL CONTINENCE AND ITS SIGNIFICANCE IN THE DIAGNOSIS OF HIRSCHSPRUNG'S DISEASE. (Eng.) Holschneider, A. M.; Kellner, E.; Streibl, P.; Sippell, W. G. (Universitats-Kinderklinik, Lindwurmstrasse 4, D-8000 Munchen 2, W. Germany). *J. Pediatr. Surg.* 11(2):151-156; 1976.

The development of the anorectal continence reaction was studied in a series of 138 electromanometric recordings performed in 62 newborn and 6 premature infants. In 11% of 45 infants observed in a longitudinal study, an internal sphincter relaxation was observed at the time of birth. The same reflex was present in about 50%, after the third day, and in all infants after the 12th day of life. After direct volume stimulation with 0.1-0.2 ml of water, a normal reflex contraction of the puborectalis muscle was recorded in all investigated infants, regardless of age. The continence reflex, however, (i.e., a reflex puborectalis contraction after an internal sphincter relaxation) developed according to the delayed maturation of the internal sphincter reflex. The results indicate that electromanometric recordings can be used to exclude aganglionic megacolon as early as the first day of life. An absent internal sphincter relaxation reflex is diagnostic only after the 12th day of life.

1210 VALUE OF COLONOSCOPY IN THE DIAGNOSIS OF DISEASE OF THE COLON (ANALYSIS OF 162 EXAMINATIONS). (Spa.) de la Santa Lopez, J.; Sayago Mota, M.; Velloso Jimenez, Y. A. (Ciudad Sanitaria, "Virgen del Rocio," Sevilla, Spain). *Rev. Clin. Esp.* 136(3):259-264; 1975.

1211 REPEATED SURGICAL INTERVENTIONS FOR CANCER OF THE COLON. (Rus.) Nurov, A. U. (Inst. Experimental Clinical Oncology, Moscow, USSR). *Khirurgiia (Mosk.)* (6):87-90; 1975.

1212 BIOPSY OF RECTAL CANCER TREATED BY CONTACT THERAPY. (Fre.) Albot, G. (Clinique Chirurgicale de l'Hotel-Dieu, 1, place du Parvis Notre-Dame, 75181 Paris Cedex 04, France). *Ann. Gastroenterol. Hepatol.* 11(1):1-14; 1975.

1213 FECALOMA SIMULATING COLONIC NEOPLASM. (Eng.) Childress, M. H.; Martel, W. (Univ. Michigan Medical Center, Ann Arbor, MI). *Surg. Gynecol. Obstet.* 142(5):664-666; 1976.

1214 CHEMOTHERAPY OF TRANSPLANTABLE ADENOCARCINOMAS OF THE COLON IN MICE. (Eng.) Double, J. A.; Ball, C. R. (Sch. Medicine, Univ. Leeds, Leeds, LS2 9NL, England). *Cancer Chemother. Rep.* 59(6):1083-1089; 1975.

1215 THE SURGICAL TREATMENT OF CARCINOMA OF THE COLON AND RECTUM: AN INDEX OF QUALITY CARE AND SOCIOLOGIC AND GEOGRAPHIC DISTRIBUTION. (Eng.) Baughman, B. B.; Knutson, C. O.; Ahmad, W.; Jones, C. E.; Polk, H. C., Jr. (Univ. Louisville Sch. Medicine, Louisville, KY 40201). *Ann. Surg.* 183(5):550-555; 1976.

1216 RECTAL CANCER: THE SPECTRUM OF SELECTIVE SURGERY. (Eng.) Mason, A. Y. (St. Anthony's Hosp., London Road, Sutton, SM3 9DW, England). *Proc. R. Soc. Med.* 69(4):237-244; 1976.

1217 STAGING COLORECTAL CANCER: IS THERE A ROLE FOR LIVER BIOPSY? (Eng.) Rosenbloom, B.; Block, J. B.; Pilch, Y. (UCLA-Harbor General Hosp., 1000 W. Carson St., Torrance, CA 90509). *Cancer Treat. Rep.* 60(3):295-296; 1976.

1218 SCREENING FOR COLON CANCER. (Eng.) Winawer, S. J.; Sherlock, P.; Schottenfeld, D.; Miller, D. G. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY 10021). *Gastroenterology* 70(5):783-789; 1976.

1219 DIFFUSE VILLOUS ADENOMATOSIS OF THE COLON: REPORT OF A CASE. (Eng.) Grosberg, S. J. (Veterans Admin. Hosp., 800 Poly Place, Brooklyn, NY 11209). *Dis. Colon Rectum* 19(3):266-268; 1976.

1220 THE CURATIVE TREATMENT OF CARCINOMA OF THE SIGMOID, RECTOSIGMOID, AND RECTUM. (Eng.) Wilson, S. M.; Beahrs, O. H. (Mayo Clinic, 200 First St. SW, Rochester, MN 55901). *Ann. Surg.* 183(5):556-565; 1976.

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1221 THE PREVENTION OF POSTOPERATIVE VENOTHROMBOSIS IN PATIENTS WITH ACUTE APPENDICITIS. (Rus.) Romaniak, M. I.; Shtefanets, B. Iu.; Shevchuk, M. G. (Ivano-Frankovsk Medical Inst., USSR). *Klin. Khir.* (8):41-44; 1975.

1222 UNUSUAL LOCATION OF AN APPENDICEAL FISTULA. (Rus.) Malgin, B. D. (Sverdlovsk Medical Inst., USSR). *Khirurgiia (Mosk.)* (7):107; 1975.

1223 MYXOMA OF THE VERMIFORM APPENDIX. (Rus.) Korenev, N. N.; Kasherenkov, V. F. (N. V. Sklifosovskii Res. Inst. Emergency Medicine, Moscow, USSR). *Khirurgiia (Mosk.)* (7):105-106; 1975.

1224 CLINICAL ASPECTS OF APPENDICITIS IN THE ELDERLY. (Ger.) Michalke, H. J. (Chirurgische Klinik mit Poliklinik, Universitat Munster, 44 Munster, Germany). *Z. Gerontol.* 8(3):181-185; 1975.

1225 ACUTE APPENDICITIS ACCOMPANIED BY AN ANAEROBIC INFECTION WITH GAS-PRODUCING BACTERIA. (Rus.) Guzeev, A. I. (Novgorod Municipal Hosp., USSR). *Khirurgiia (Mosk.)* (8):119-120; 1975.

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1227 ELECTROMYOGRAPHIC STUDY OF THE ABDOMINAL WALL IN ACUTE APPENDICITIS. (Rus.) Shaimardanov, R. Sh.; Kochnev, O. S.; Alatyrev, V. I. (V. I. Lenin Postgraduate Medical Inst., Kazan, USSR). *Klin. Khir.* (8):33-37; 1975.

1228 THE DIAGNOSIS AND TREATMENT OF ACUTE APPENDICITIS IN ELDERLY PATIENTS. (Rus.) Liulka, A. N.; Mazurik, M. F.; Dudenko, F. I.; Skomorovskii, A. Ts.; Pllipenko, V. P.; Denisiuk, V. K.; Samokhina, L. S. (Poltava Medical Inst., USSR). *Klin. Khir.* (8):30-33; 1975.

1229 REPEATED SURGERY AFTER APPENDECTOMY. (Rus.) Parfirev, G. M. (Aksakovneft MSCh NGDU, Priutovo, Bashkir ASSR, USSR). *Khin. Khir.* (8):62-65; 1975.

1230 REPEATED SURGERY FOR COMPLICATIONS OF APPENDICITIS IN CHILDREN. (Rus.) Mazurik, M. F.; Pilipchenko, A. B.; Trostian, A. N.; Melnik, V. N. (Poltava Regional Clinical Hosp., USSR). *Khirurgiia (Mosk.)* (7):94-98; 1975.

1231 INTRA-ABDOMINAL BLEEDING FOLLOWING APPENDECTOMY. (Rus.) Zakashanskii, I. G.; Strugatskii, I. D. (Central Municipal Clinical Hosp., Kharkov, USSR). *Khirurgiia (Mosk.)* (7):98-100; 1975.

1232 ACUTE APPENDICITIS IN PATIENTS WITH THE APPENDIX IN ANOMALOUS LOCATIONS. (Rus.) Kozlov, I. Z.; Kalugina, G. V. (I. M. Sechenov 1st Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (7):23-26; 1975.

1233 INTESTINAL OBSTRUCTION DUE TO ADHESIONS FOLLOWING APPENDECTOMY. (Rus.) Arapov, D. A.; Tsarev, N. I.; Bratanchuk, B. F.; Pugachev, A. F. (No affiliation given). *Khirurgiia (Mosk.)* (7):26-28; 1975.

1234 APPENDICEAL ABSCESS: A CHALLENGE IN ABDOMINAL MASSES IN CHILDREN. (Eng.) Landry, M.; Mayor, G.; Queloz, J. (Univ. Hosp., CH-1011 Lausanne, Switzerland). *Radiol. Clin.* 44(5): 432-439; 1975.

1235 TUBERCULOSIS OF THE COLON. (Fre.) Arsac, M.; Cossa, J. -F. (Hopital Corentin Celton, 92130 Issy-les-Moulineaux, France). *Sem. Hop. Paris* 51(23):1565-1568; 1975.

1236 BILE SALT METABOLISM IN INTESTINAL TUBERCULOSIS INCREASED GLYCINE: TAURINE RATIO OF CONJUGATED BILE SALTS. (Eng.) Desai, H. G.; Zaveri, M. P.; Antia, F. P. (B.Y.L. Nair Charitable Hosp., Dr. A.L. Nair Road, Bombay-40008, India). *Indian J. Med. Res.* 63(12):1767-1773; 1975.

1237 HYPERTROPHIC COLONIC TUBERCULOSIS. (Eng.) Thomas, W. M. C.; Panicker, C. (Carnarvon District Hosp., Carnarvon, West Australia 6701). *Med J. Aust.* 1(12)401-402; 1976.

1238 THE COMBINED APPEARANCE OF SPINAL ANOMALIES AND DIVERTICLES OF THE COLON. (Ger.) Mollers, I.; Zimmermann, W. (Krankenhausefur Naturheilweisen, 8-Munchen-Harlaching, Munich, Sanatoriumsplatz 2, Germany). *Med. Klin.* 70(17):766-770; 1975.

1239 RECTAL DIVERTICULOSIS: REPORT OF ONE CASE. (Spa.) Sandoval, O.; Perez, J. M. H. (Hospital Regional de Guines, Guines, Cuba). *Rev. Cub. Cir.* 14(1):75-80; 1975.

1240 BASIC PATHOLOGY OF SIGMA AND RECTUM IN GERIATRIC-GYNECOLOGICAL LAPAROTOMIES. (Ger.) Jaluvka, V.; Felshart, Kl. -J. (Frauenklinik und -poliklinik, Freien Universitat Berlin, 1 Berlin 45, Hindenburgdamm, 30, Germany). *Geburtshilfe Frauenheilkd.* 35(1):10-20; 1975.

1241 COLOVESICAL FISTULA. (Spa.) Torres R. de Torres, E.; Alcantara Gijon, F. (Ciudad Sanitaria "Virgen Rocio," Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 46(2):161-170; 1975.

1242 FAT THICKNESS IN THE NEONATAL SMALL LEFT COLON SYNDROME. (Eng.) Kuhns, L. R.; Berger, P. E.; Poznanski, A. K.; Holt, J. F. (C. S. Mott Children's Hosp., Ann Arbor, MI). *Am. J. Roentgenol.* 126(3):538-541; 1976.

1243 COLONIC LYMPHOID-GLANDULAR COMPLEX (MICROBURSA): NATURE AND MORPHOLOGY. (Eng.) Kealy, W. F. (King's Coll. Hosp., London, England). *J. Clin. Pathol.* 29(3):241-244; 1976.

1244 THE RECORDING OF ANORECTAL PRESSURES: APPLICATION TO THE CLASSIFICATION OF CONSTIPATION. (Fre.) Gouin, B.; Gosset, F.; Hardouin, J. -P. (Hopital Louis-Maurier, 178, rue des Renouillers, 92700 Colombes, France). *Entretiens Bichat Med.* 47-52; 1974.

1245 PERFORATION OF THE COLON. (Eng.) Menda, R. K. (G. T. Hosp., Bombay, India). *Indian J. Surg.* 37(1):19-25; 1975.

1246 JUVENILE POLYPOSIS OF THE COLON. (Eng.) Franken, E. A.; Bixler, D.; Fitzgerald, J. F.; Gamet, D. J.; Russ, M. A.; (Indiana Univ. Medical Center, 1100 West Michigan St., Indianapolis, IN 46202). *Ann. Radiol.* 18(4):499-504; 1975.

1247 THE INCIDENCE AND CLINICAL SIGNIFICANCE OF RECTAL POLYPS. (Eng.) Payne, R. A. (North Middlesex Hosp., London, England). *Ann. R. Coll. Surg. Engl.* 58(3):241-242; 1976.

1248 COLITIS CYSTICA PROFUNDA. (Eng.) Bhuta, I.; Prathikanti, V. (347 S. Ripley, Montgomery, AL 36104). *South. Med. J.* 69(4):495-496; 1976.

1249 CLINDAMYCIN-INDUCED PSEUDOMEMBRANOUS COLITIS: REPORT OF THREE CASES. (Eng.) Lemos, L. B.; Baba, N.; de Araujo, O. J. (Ohio State Univ., Coll. Medicine, 370 West Ninth Ave., Columbus, OH 43210). *Am. J. Clin. Pathol.* 65(4): 455-461; 1976.

1250 COLITIS AND DIARRHOEA: A PROBLEM WITH ANTIBIOTIC THERAPY. (Eng.) Beavis, J. P.; Parsons, R. L.; Salfield, J. (Guy's Hosp., London, England). *Br. J. Surg.* 63(4):299-304; 1976.

1251 DEFINITION OF DIETARY FIBER AND HYPOTHESIS THAT IT IS A PROTECTIVE FACTOR IN CERTAIN DISEASES. (Eng.) Trowell, H. (Woodgreen, Fordingbridge SP6 2AZ, Hampshire, England). *Am. J. Clin. Nutr.* 29(4):417-427; 1976.

See also, 0779, 0961, 0966, 0967, 0969, 0972, 0986, 0993, 0994, 0996, 0998, 0999, 1057, 1159, 1161, 1162, 1172, 1174, 1175, 1177, 1179, 1182, 1202, 1254, 1484, 1493, 1495, 1497, 1508, 1529, 1530, 1538, 1539, 1540, 1547.

LARGE INTESTINE

Ulcerative Colitis

1252 TREATMENT OF ULCERATIVE COLITIS WITH ORAL DISODIUM CROMOGLYCATE: A DOUBLE-BLIND CONTROLLED TRIAL. (Eng.) Mani, V.; Green, F. H. Y.; Lloyd, G.; Fox, H.; Turnberg, L. A. (Manchester Royal Infirmary, Manchester, England). *Lancet* 1(7957):439-441; 1976.

Twelve patients with ulcerative proctocolitis were treated for 6 months with each of p.o. disodium cromoglycate (2 g/day) and placebo in a double-blind crossover trial. The active drug significantly improved the patients' sense of well-being and the sigmoidoscopic and rectal biopsy appearances. Side effects were minor (nausea, rash, and bitter taste), and they disappeared without withdrawal of the drug. Therapy was discontinued in two patients developing elevated serum transaminase levels. The authors conclude that the p.o. administration of disodium cromoglycate may have a place in the long term management of ulcerative proctocolitis since inflammatory changes in the bowel appear to be favorably influenced.

1253 IMMUNOSUPPRESSION IN THE TREATMENT OF INFLAMMATORY BOWEL DISEASE: II. THE EFFECTS OF AZATHIOPRINE ON LYMPHOID CELL POPULATIONS IN A DOUBLE BLIND TRIAL IN ULCERATIVE COLITIS. (Eng.) Campbell, A. C.; Skinner, J. M.; Maclennan, I. C. M.; Hersey, P.; Waller, C. A.; Wood, J.; Jewell, D. P.; Truelove, S. C. (Swiss Inst. Experimental Cancer Res., 1011 Lausanne, Switzerland). *Clin. Exp. Immunol.* 24(2):249-258; 1976.

Blood lymphocytes and rectal plasma cells were studied in 26 patients with ulcerative colitis to evaluate the effect of treatment with azathioprine. Treatment for 1 yr (2.5 mg/kg/day) resulted in a modest decrease in lymphocyte count, with little change in neutrophils or platelets. There was no major change in the proportions of circulating T and B lymphocytes, suggesting that the number of such cells per milliliter of blood fell in proportion to the change in lymphocyte count. The number of plasma cells in the rectal lamina propria was

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reduced to a mean less than half that of the control patient group. Blood antibody-dependent lymphocyte-mediated cytotoxicity (K-cell activity) fell at least 25-fold after 1 yr treatment. Phytohemagglutinin-induced cytotoxicity was also reduced, but less consistently. Reduced K-cell activity is interpreted as reflecting depletion of effector cells from the circulation. The fall in lymphocyte count, K-cell activity, and gut plasma cells was slow, indicating continuous inhibition of lymphopoiesis or differentiation throughout the trial period. Thus, azathioprine administration results in some immunosuppressive effects that develop only after prolonged treatment. The clinical results of the trial did not show that azathioprine had a major beneficial effect in the treatment of ulcerative colitis, nor were there clear correlations between the results of lymphocyte assays and clinical response in individual patients.

1254 ILEORECTAL ANASTOMOSIS IN ULCERATIVE COLITIS: RESULTS IN 57 PATIENTS. (Eng.) Gruner, O. P. N.; Flatmark, A.; Naas, R.; Fretheim, B.; Gjone, E. (Rikshospitalet, Oslo 1, Norway). *Scand. J. Gastroenterol.* 10(6):641-646; 1975.

The results of ileorectal anastomosis (IRA) were evaluated in 57 patients with ulcerative colitis. The operative mortality was 7% in all cases and 10.5% in fulminating cases. Of 48 patients who were initially discharged from the hospital with IRA, 3 developed cancer of the rectal stump. Half of all surviving patients needed rectal extirpation and ileostomy because of rectal dysfunction. Rectal function, stenosis, and inflammation were significantly worse in women than in men. Dyspareunia was experienced in 8 of 15 women with IRA. The authors suggest that the use of IRA in the treatment of ulcerative colitis may not be justified due to the increased risk of developing rectal cancer.

1255 THE DIAGNOSIS AND TREATMENT OF ULCERATIVE COLITIS IN CHILDHOOD. (Ger.) Ijaiya, K.; Hubschmann, K.; Reitzig, P. (Kinderklinik, Humboldt-Univ., 104 Berlin, Schumann-str. 20/21, Germany). *Kinderaerztl. Prax.* 42(12):543-551; 1974.

1256 ANTIPERISTALTIC ILEOPROCTOSTOMY AFTER TOTAL COLECTOMY DUE TO CHRONIC ULCERATIVE COLITIS. (Spa.) Repetto, J. L. B. (Hosp. Pasteur, Montevideo, Uruguay). *Cir. Urug.* 45(1):33-38; 1975.

1257 INTEREST AND LIMITS OF RECTAL BIOPSY IN ULCERATIVE COLITIS AND CROHN'S DISEASE. (Fre.) Camilleri, J. -P. (Hopital Broussais, 96 rue Didot, 75674 Paris Cedex 14, France). *Ann. Gastroenterol. Hepatol.* 11(1):15-26; 1975.

1258 TREATMENT OF ULCERATIVE COLITIS WITH DISODIUM CROMOGLYCATE: A LONG-TERM DOUBLE-BLIND CLINICAL TRIAL [Abstract]. (Eng.) Mani, V.; Lloyd, G.; Green, F.; Fox, H.; Turnberg, L. A. (Manchester Royal Infirmary, Manchester, England). *Gut* 16(10):832; 1975.

1259 BACTERIAL BREAKDOWN OF SULPHASALAZINE (SALAZOPYRIN) [Abstract]. (Eng.) Azad Khan, A. K.; Johnston, H. H.; Truelove, S. C. (Radcliffe Infirmary, Oxford, England). *Gut* 16(10); 832; 1975.

1260 ULCERATIVE COLITIS IN APES: A COMPARISON WITH THE HUMAN DISEASE. (Eng.) Scott, G. B. D.; Keymer, I. F. (Royal Free Hosp., London, England). *J. Pathol.* 115(4):241-244; 1975.

1261 INFLAMMATORY COLORECTAL DISEASE AND PREGNANCY: REPORT OF A CASE. (Eng.) Ganchrow, M. I.; Benjamin, H. (Good Samaritan Hosp., Suffern, NY). *Dis. Colon. Rectum* 18(8):706-709; 1975.

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1265 STUDIES OF RECTAL MUCOSAL CATECHOLAMINES IN ULCERATIVE COLITIS. (Eng.) Penttila, O.; Kyosola, K.; Klinge, E.; Ahonen, A.; Tallqvist, G. (Maria Hosp., Lapinlahdenkatu 16, 00180 Helsinki 18, Finland). *Ann. Clin. Res.* 7(1):32-36; 1975.

1266 CHARACTERISTICS OF THE ULTRASTRUCTURAL ORGANIZATION OF PRISMATIC CELLS OF THE LARGE INTESTINE IN NONSPECIFIC ULCERATIVE COLITIS. (Rus.) Gokhberg, S. L.; Rasulev, N. I. (Scientific Res. Inst. Rural Medicine, Uzbek SSR Ministry of Health, Tashkent, USSR). *Arkh. Patol.* 37(4):55-60; 1975.

1267 SERUM HAPTOGLOBIN AND α_1-ACID GLYCOPROTEIN CHANGES IN DIFFERENT FORMS OF NONSPECIFIC ULCERATIVE COLITIS. (Rus.) Shmykova, L. M.; Chernomordik, A. E.; Levitan, M. Kh.; Shevchenko, M. A. (Scientific Res. Lab. Proctology, Russian SFSR Ministry of Health, Moscow, USSR). *Sov. Med.* (3):30-35; 1975.

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See also, 0966, 0967, 0972, 0995, 0996, 0997, 1245, 1251, 1544, 1545, 1546.

PANCREAS

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1271 SYMPOSIUM ON DIAGNOSIS OF PANCREATIC DISEASE. PANCREATIC FUNCTION TESTS: THE PHYSIOLOGICAL BACKGROUND. (Eng.) Scratcherd, T. (Dept. Physiology, Univ. Sheffield, Sheffield, England). *Gut* 16(8):648-663; 1975.

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1274 EXAMINATION OF BILE DURING OPERATIONS FOR SOME DISEASES OF THE PANCREAS AND GALLBLADDER. (Rus.) Bukin, A. S. (Zaporozhye Inst. for Postgraduate Training of Physicians, Zaporozhye, USSR). *Vrach. Delo* (6):14-17; 1975.

1275 PANCREATOCHOLANGIOGRAPHY BY MEANS OF DUODENOSCOPE. (Spa.) Ortega Borjas, J. A. (Hospital General del Instituto Venezolano de los Seguros Sociales, Caracas, Venezuela). *GEN* 28(2/3/4): 99-109; 1974.

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1279 DIARRHEA IN VERNER-MORRISON SYNDROME. (Fre.) Matuchansky, C. (No affiliation given). *Arch. Fr. Mal. App. Dig.* 64(3):281-282; 1975.

1280 THE VALUE OF PANCREATIC BIOPSIES IN THE DIAGNOSIS OF PANCREATIC DISEASE. (Ger.) Bader, G.; Holzhausen, H. (DDR-25 Rostock, Majakowskistr. 52, Germany). *Zentralbl. Chir.* 100(9): 541-545; 1975.

See also, 0942, 0963, 0971, 0973, 0975, 0976, 0984, 1004, 1013, 1014, 1057, 1064, 1090, 1106, 1145, 1176, 1183, 1186, 1284, 1293, 1391, 1439, 1465, 1477.

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PANCREAS

Pancreatitis

1281 GASTRIC INHIBITORY POLYPEPTIDE (GIP) IN CHRONIC PANCREATITIS. (Eng.) Botha, J. L.; Vinik, A. I.; Brown, J. C. (Endocrine and Diabetes Research Unit, Univ. Cape Town, Cape Town, South Africa). *J. Clin. Endocrinol. Metab.* 42(5):791-797; 1976.

Gastric inhibitory polypeptide (GIP) responses to the ingestion of glucose were studied in five male patients with chronic pancreatitis and in five control subjects. After an overnight fast, an indwelling cannula was inserted into an antecubital vein for blood sampling. After taking three basal samples, 50 g glucose in 150 ml water was ingested and additional blood samples were drawn at 1, 3, 5, 10, 20, 30, 60, 90, and 120 min thereafter. Both the mean blood glucose levels and the response to glucose ingestion were significantly higher, at all times, in the patients than in the controls. Following glucose ingestion, there was a rapid rise in circulating GIP before the rise in circulating insulin or glucose concentrations. The rise in GIP concentration was significant at 10 min in patients and at 20 min in controls. The GIP levels were significantly higher in patients at 10, 20, and 30 min after ingestion of glucose. The mean fasting plasma insulin levels were similar in patients and in controls. After ingestion of glucose, there was a more rapid and significantly higher rise in insulin concentration in controls at 20 and at 30 min, but the mean peak concentrations were not significantly different. The mean fasting plasma pancreatic glucagon-like immunoreactivity (PGLI) levels in patients were higher than in controls. After ingestion of glucose, there was an apparent but insignificant rise within the first 5 min in both patients and controls. These levels were maintained in patients and were significantly higher than in the controls at 10, 20, and 60 min after ingestion. The mean fasting plasma gut glucagon-like immunoreactivity (GGLI) levels in patients were higher. Following glucose ingestion, a sharp early rise occurred in the patients' levels, reminiscent of the GIP response and the 5 and 10 min levels were significantly higher than in controls who were not significantly affected by glucose. These findings confirm earlier reports that oral glucose stimulates the release of GIP from the gastrointestinal tract in normals. A further similarity between pancreatic and genetic diabetes, namely the hypersecretion of GIP, was also demonstrated.

1282 PROSTAGLANDIN RELEASE IN CANINE ACUTE HAEMORRHAGIC PANCREATITIS. (Eng.) Glazer, G.; Bennett, A. (St. Mary's Hosp. Medical Sch., London, England). *Gut* 17(1):22-26; 1976.

The prostaglandin (PG)-like activity in dog pancreatic venous blood, the general circulation, and the peritoneal exudate after the induction of acute hemorrhagic pancreatitis (AHP) were measured in adult greyhound dogs following a bile salt/trypsin injection into the main pancreatic duct. All dogs showed the macroscopic changes of edema, congestion, and hemorrhagic areas in the pancreas together with a serosanguinous peritoneal exudate. They demonstrated an acute transitory fall in blood pressure (BP) during the infusion of the bile salt/trypsin mixture. The BP fell steadily throughout the experiment from a mean basal of 155 mmHg to 75 mmHg at 3 hr following the injection. Blood amylase rose. Hemoconcentration occurred, as reflected in the rising hematocrit. The level of PG-like material in the pancreatic venous blood of dogs with AHP rose steadily from a mean average basal level of 0.3 ng/ml PGE_2 equivalents to 1.0 ng/ml at 30 minutes and 1.7 ng/ml at 3 hr. The levels in mixed venous blood did not change significantly in either the treated or the control group, and although the mean level of PG-like material in th arterial blood of dogs with AHP was higher than in controls, this did not reach statistical significance. Large amounts of PG-like material occurred in the peritoneal exudates from dogs with AHP (43 ng/ml PGE_2 equivalents). Chromatographic analysis and susceptibility to alkaline hydrolysis indicated a PGE compound with traces of other activity in some samples. Results indicate that during the early stages of AHP in the dog, PG-like material is released into the pancreatic venous blood. The peritoneal exudate contains substantial PG-like activity as well. As pancreatic vasoconstriction during acute pancreatitis increases tissue anoxia and acinar cell damage and eventually causes gland necrosis, local vascular effects of PG's may be important. It is concluded that prostaglandins contributed to the induced pancreatitis.

1283 ACUTE HEMORRHAGIC PANCREATIC NECROSIS IN MICE. INTRAPARENCHYMAL ACTIVATION OF ZYMOGENS, AND OTHER ENZYME CHANGES IN PANCREAS AND SERUM. (Eng.) Rao, K. N.; Tuma, J.; Lombardi, B. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Gastroenterology* 70(5):720-726; 1976.

The relation between intraparenchymal activation of the proteolytic zymogens of the pancreas and acute hemorrhagic pancreatic necrosis (AHPN) was studied in 30 day old female Swiss Webster mice fed a choline-deficient diet supplemented with 0.5% DL-ethionine. The diet caused two major changes in the pancreas: a marked increase in the weight and protein content of the organ, and the appearance in the gland of substantial amounts of active pancreatic proteases. The increases in weight and protein were sustained by increased contents of zymogens and amylase. This accumulation of zymogens is one of the earliest characteristics of the process. It may also be critical in the development of AHPN, as it leads to the presence in the acinar cells of abnormally high quantities of dangerous materials. After 2 and 3 day of feeding, 70-90% of the elastolytic activity was present as elastase, whereas trypsin and chymotrypsin constituted only a small fraction of the trypsinogen and chymotrypsinogen contents. These findings indicate that the endogenous buffering capacity of the pancreas was overcome. The decline of α_1-antitrypsin and of α_2-macroglobulin from the first to the third day of treatment indicates that active pancreatic proteases were transferred into the circulation and reacted with the inhibitors, thus decreasing their blood levels. The results indicate that input of trypsin or of other pancreatic enzymes into the circulation is the triggering factor in the onset of the deep shock-like state that precedes the death of the mice with AHPN. Proteases and lipases, transferred via the circulation or spilled into the peritoneal cavity, may account for the diffuse necrosis of the peritoneal fat tissues that accompanies pancreatitis.

1284 ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY (ERCP) IN THE DIAGNOSIS OF PANCREATIC INFLAMMATORY DISEASE. (Eng.) Zimmon, D. S.; Falkenstein, D. B.; Abrams, R. M.; Seliger, G.; Kessler, R. E. (Veterans Admin. Hosp., First Ave. at East 24 St., New York, NY). *Radiology* 113(2): 287-292; 1974.

1285 EXPERIMENTAL STUDY IN THE RAT BY PANCREATIC INJECTION OF A TRI-IODIC CONTRAST MEDIUM. OPTICAL AND ELECTRON MICROSCOPE ANALYSIS. (Fre.) Heully, F.; Serot, J. M.; Gaucher, P.; Rauber, G.; Boissel, P.; Jeanpierre, R. (Hopital de Brabois, F-54500 Vandoeuvre-les-Nancy, France). *Nouv. Presse Med.* 4(28):2095-2098; 1975.

1286 SURGICAL TREATMENT OF ACUTE PANCREATITIS: LITERATURE REVIEW. (Rus.) Smakov, G. M. (Moscow Inst. Medical Stomatology, Moscow, USSR). *Khirurgiia (Mosk.)* (7):120-126; 1975.

1287 SURGICAL TREATMENT FOR UNCOMPLICATED PANCREATIC PSEUDOCYST. (Por.) Pinotti, H. W. (Faculty Medicine, Univ. Sao Paulo, Brazil). *Arq. Gastroenterol.* 12(2):135-137; 1975.

1288 CURRENT VIEWS ON THE USE OF TRASYLOL IN ACUTE AND CHRONIC PANCREATITIS. (Pol.) Lech Poltorak, J. (Oddzial Chirurgii Ogolnej Szpitala Bielanskiego, 01-640 Warsaw, ul. Jana Paska 9, Poland). *Pol. Tyg. Lek.* 30(44):1847-1850; 1975.

1289 CLINICAL AND LABORATORIAL ASPECTS OF CHRONIC PANCREATITIS: STUDY OF 80 CASES. (Por.) de Barros Mott, C.; Okhi, Y.; Barros, M. I. B.; Conte, V. P.; Machado, M. C. C.; Bove, P.; Bettarello, A. (Hospital das Clinicas de Sao Paulo, Sao Paulo, Brasil). *Arq. Gastroenterol.* 12(2):89-93; 1975.

1290 FATAL CASES OF ACUTE PANCREATITIS. (Ger.) Schmidt, D. (Medizinische Akademie "Carl Gustav Carus," DDR-8019 Dresden, Fetscherstr. 74, Germany). *Zentralbl. Chir.* 100(9):513-526; 1975.

1291 HEREDITARY CHRONIC PANCREATITIS. (Fre.) Paris, J.; Paris, J. -C. (C.H.U., F 59000 Lille, France). *Arch. Fr. Mal. App. Dig.* 64(4):293-297; 1975.

1292 CHRONIC HEREDITARY PANCREATITIS. (Fre.) Paris, M. J. (No affiliation given). *Bordeaux Med.* 8(7):783; 1975.

1293 NORMAL PANCREATIC DUCT SYSTEM IN SEVERE CHRONIC PANCREATITIS OF THE HEAD OF THE PANCREAS. (Eng.) Falck, J.; Voigt, K. (Hosp. St. Josef, 36 Wuppertal-Elberfeld, Bergstr. 6-12, Germany). *Endoscopy* 7(3):173-175; 1975.

1294 MULTIPLE PANCREATIC LITHIASIS. REPORT OF A CASE WITH 140 PANCREATIC STONES. (Eng.) Stamatiadis, E. C.; Androulakakis, P. A. (Rhodos General Hosp., Rhodos, Greece). *Chir. Gastroenterol.* 9(3):403-405; 1975.

1295 PANCREATITIS WITH NODULAR CUTANEOUS LESIONS AND ARTHRITIS. (Eng.) Strole, W. E., Jr.; Vickery, A. L., Jr. (Massachusetts General Hosp., Boston, MA). *N. Engl. J. Med.* 293(15):764-769; 1975.

1296 ASCITES IN PANCREATITIS. (Rus.) Kobyliatskii, I. T. (Dnepropetrovsk Medical Inst., USSR). *Vrach. Delo* (8):94-96; 1975.

1297 ASSOCIATION OF INTRALUMINAL DUODENAL DIVERTICULUM WITH ACUTE PANCREATITIS. (Eng.) Nosher, J. L.; Seaman, W. B. (Columbia-Presbyterian Medical Center, New York, NY 10032). *Radiology* 115(1):21-22; 1975.

1298 HYPERLIPIDEMIA AND PANCREATITIS. (Fre.) Blanchon, P.; Brochier, P.; Holler, A. (Hopital Bicetre, 78 rue General-Leclerc, 94270 Bicetre, France). *Entretiens Bichat Med.* 353-358:1974.

See also, 0975, 1016, 1280, 1413.

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1299 α_1-ANTITRYPSIN DEFICIENCY AND LIVER DISEASE IN CHILDREN.

(Eng.) Burke, J. A.; Kiesel, J. L.; Blair, J. D. (Univ. Kentucky Medical Center, Lexington, KY 40506). *Am. J. Dis. Child.* 130(6):621-629; 1976.

The clinical, biochemical, and hepatic morphologic findings in 10 children with severe serum α_1-antitrypsin deficiency are presented. Genetic protease inhibitor (Pi) phenotyping, using acid-starch gel and crossed antigen-antibody electrophoresis, demonstrated Pi phenotype ZZ in all cases. In eight patients, manifestations of liver disease appeared during the first year of life. The case reports show that α_1-antitrypsin deficiency should be suspected in any child with neonatal hepatitis, unexplained hepatomegaly or splenomegaly, or cirrhosis. One of the reported infants was normal at age 6 months, and one infant had progressive hepatic damage that culminated in liver failure and death at age 6 months. The variable clinical course and prognosis for infants with severe α_1-antitrypsin deficiency is well illustrated by these two infants.

1300 COMPLEMENT STUDIES IN ALPHA-1-ANTITRYPSIN DEFICIENCY IN CHILDREN.

(Eng.) Le Prevost, C.; Frommel, D.; Dupuy, J. -M. (U-56 INSERM, Hopital d'Enfants, Bicetre, France). *J. Pediatr.* 87(4):571-573; 1975.

The complement system of 18 children with alpha-1-antitrypsin deficiency associated with liver disease was studied to determine the consequence of the lack of a major antiprotease. Component 4 (C4) was the only component displaying decreased values, with an average hemolytic titer of 32% (range, 5-60%) and an average immunochemical titer of 42% (range, 5-68%). C4 hemolytic values determined in 31 controls appeared normal (100-113%). Components C1-C9, C1q, C1s, and C3PA were all normal. Prospective studies including sequential determinations of C4 related to the clinical evolution of liver disease may be valuable.

1301 THE DISPARITY OF THE SIZE OF THE LIVER AS DETERMINED BY PHYSICAL EXAMINATION AND BY HEPATIC GAMMASCANNING IN 504 PATIENTS.

(Eng.) Ariel, I. M.; Briceno, M. (Pack Medical Foundation, 137 E. 36th St., New York, NY 10016). *Med. Pediatr. Oncol.* 2(1):69-73; 1976.

The extent that the liver extended inferior to the costal margin as determined by physical examination (palpation, percussion, and after deep inspiration) in 504 patients was compared to the size determined by hepatic gammascanning. Scanning was performed using ^{131}I rose bengal, radioactive gold, or ^{99m}technetium sulfur colloid. Hepatic gammascanning revealed that the liver extended inferior to the costal margin a minimum of 5 cm in 259 of the 504 patients. However, physical examination revealed a palpable liver in only 123 patients. This study demonstrates that physical examination by palpation is not a good index for determining hepatomegaly.

1302 INCREASED SULFOBROMOPHTHALEIN CLEARANCE IN A PATIENT RECEIVING PHENOBARBITAL AND OTHER ANTICONVULSANT DRUGS.

(Eng.) Capron, J. P.; Erlinger, S.; Feldmann, G. (Unite de Recherches de Physiopathologie Hepatique, Hopital Beaujon, 92110 Clichy, France). *Gastroenterology* 69(3):756-760; 1976.

A marked enhancement in the plasma disappearance rate of BSP, along with signs of hepatic microsomal enzyme induction, are reported in a 43-yr-old man who was taking anticonvulsant drugs. He received phenobarbital from the age of 13 yr (0.20-0.40 g/day), diphenylhydantoin for a 5-yr period (0.20 g/day), primadone (0.75 g/day), and clonazepam (0.004 g/day) for 2 yr previous to the study. There was a marked increase in the fractional clearance rates of BSP, dibromosulfophthalein, and indocyanine green in comparison to normal standards. This was related to a marked increase in hepatic blood flow, while hepatic extraction remained normal. There was an associated twofold increase in liver bilirubin UDP-glucuronyltransferase activity and hypertrophy of the smooth endoplasmic reticulum in the hepatocytes. It is concluded that drug administration (especially phenobarbital) should be considered as a possible cause of increased BSP clearance in man.

1303 NUCLEOTIDE PYROPHOSPHATASE AND PHOSPHODIESTERASE I. DEMONSTRATION OF ACTIVITY IN NORMAL SERUM, AND AN INCREASE IN CHOLESTATIC LIVER DISEASE.

(Eng.) Haugen, H. F.; Skrede, S. (Inst. Clinical Biochemistry, Univ. Oslo, Oslo 1, Norway). *Scand. J. Gastroenterol.* 11(2):121-127; 1976.

The presence of nucleotide pyrophosphatase/phosphodiesterase I in normal sera, and its increase in liver disease were investigated in 10 normal, nonfasting blood donors and in patients diagnosed as having acute hepatitis (11), active chronic hepatitis (21), primary biliary cirrhosis (14), and malignant bone lesions (5). Nucleotide pyrophosphate was present in normal human serum. Also thymidine-5'-monophospho-nitrophenyl ester was hydrolyzed in normal human serum, with a K_m of about 0.20-0.25 mM. The pH-optimum of phosphodiesterase activity was very close t or identical with the optimum of nucleotide pyrophosphatase, about 9.8. Contrary to expectations, 3M urea inhibited alkaline phosphatases in sera from patients with liver disease or bone lesions completely whereas phosphodiesterase I was only moderately inhibited. Uridine diphosphoglucose (UDPH, 1 mM) did not inhibit alkaline phosphatases, but it did cause a marked inhibition of phosphodiesterase I by a competitive pattern. The extent of phosphodiesterase I inhibition by urea was not different in sera from normal individuals, pregnant women, and from patients with liver diseases or bone lesions. Total, as well as urea-inhibited phosphodiesterase I activity, was increased in normal pregnancy and in bone lesions. In both acute viral hepatitis and active chronic hepatitis, a slight increase was noted in a few cases (about 20%), whereas 80% of the patients with primary biliary cirrhosis had increased levels. Levels of phosphodiesterase I and nucleotide pyrophosphatase were significantly higher in primary biliary cirrhosis than in active chronic hepatitis. It is suggested tha further studies are necessary to evaluate the diagnostic role of nucleotide pyrophosphatase/phosphodiesterase I.

1304 BILE CANALICULAR ALKALINE PHOSPHATASE IN NECROPSY SPECIMENS OF THE LIVER AND ITS RELATION TO DISEASE.

(Eng.) Hagerstrand, I. (General Hosp., Malmo, Sweden). *Acta Pathol. Microbiol. Scand.* [*A*] 84(3):278-284; 1976.

The frequency of canalicular alkaline phosphatase activity from 185 consecutive autopsies, its relation to the patient's disease, and a comparison with diseases of subjects without such activity was investigated. Of all the subjects with malignant tumors and liver involvement, 77% had canalicular alkaline phosphatase. No correlation was found between the type or extent of the tumor and the presence or absence of canalicular alkaline phosphatase. However, metastases to the liver and lungs were found less frequently in subjects with a normal sinusoidal hepatic reaction. An assumed connection between the canalicular enzyme activity and the Pi Z gene was not demonstrated. Centrolobular hepatic necroses were associated with alkaline phosphatase activity of the bile canaliculi in the remaining parenchyma. Any association between use of drugs or alcohol abuse and the occurrence of canalicular alkaline phosphatase was not demonstrated. No correlation was noted between total serum alkaline phosphatase and the histochemical pattern of the enzyme in the liver. It is concluded that isolated canalicular increase of alkaline phosphatase reaction is the common pattern of collagen diseases and centrolobular hepatic necroses, while tumor diseases without involvement of the liver might show both an isolated canalicular increase and a combined canalicular and sinusoidal increase.

1305 PRIMARY FIBROSARCOMA OF THE LIVER: CASE REPORT AND REVIEW OF THE LITERATURE.

(Eng.) Alrenga, D. P. (Cook County Hosp., 1825 W. Harrison St., Chicago, IL 60612). *Cancer* 36(2): 446-449; 1975.

A case of primary fibrosarcoma of the liver associated with cirrhosis occurring in a 51-yr-old man is presented. The patient had no history of alcoholism, hepatitis, or exposure to any hepatotoxic substances, but suffered a 30-lb weight loss, prior to hospitalization. At autopsy, the tumor was 17 cm in diameter and was observed to invade the portal vein. No metastases were found. Fifteen additional cases of this unusual neoplasm are reviewed.

1306 ELECTRON MICROSCOPIC OBSERVATION OF THE LIVER IN CHILDREN WITH HURLER'S SYNDROME.

(Jpn.) Horino, K.; Orii, T.; Denpo, K. (Sapporo Medical Coll., Sapporo, Japan). *Nihon Rynsho Denshi Kenbikyo Gakkai-Shi* 7(1):73-82; 1974.

Liver specimens from two boys (biopsy, 5-yr-old; autopsy, 13-yr-old) with Hurler's syndrome were studied by electron microscopy, and compared to other cases of mucopolysaccharidosis and mucolipidosis. Numerous storage vacuoles, implying typical accumulation of mucopolysaccarides, were found in the cytoplasm of hepatocytes and sinusoidal cells. In the hepatocyte vacuoles, fine reticula were scattered, and near the limiting membranes, electron dense granules, vesicles, and myelin-like structures were found. Absence of normal peribiliary dense bodies (lysosomes) indicated that storage vacuoles arose from lysosomes. Many mitochondria exhibited budding phenomena. These buds (0.1-0.2 μm in size) separated from the mitochondria, and were converted to vesicles near the mitochondria. Vacuoles that were smaller than those found in hepatocytes (0.5-10.0 μm) were found in the sinusoidal cells (0.5-1.5 μm). Sinusoidal cell vacuoles were relatively electron lucid; vesicles and electron dense granules were not present. Cellular debris and vacuoles were scattered in the sinusoids. In general, abnormal storage patterns were found in the epithelial cells for mucopolysaccharidoses and in the interlobar cells for mucolipidoses.

1307 NODULAR REGENERATIVE HYPERPLASIA OF THE LIVER.

(Eng.) Knowles, D. M., II; Kaye, G. I.; Godman, G. C. (Coll. Physicians and Surgeons, Columbia Univ., 630 W. 168 St., New York, NY 10032). *Gastroenterology* 69(3):746-751; 1975.

A case of nodular regenerative hyperplasia of the liver in a 42-yr-old man is reported and 19 apparent cases in the English literature are reviewed. When examined, the patient was found to have abnormal liver function tests. He later developed episodic shaking chills, fever, and hepatosplenomegaly. Laparotomy and liver biopsy were negative, and the man was discharged without diagnosis. At laparotomy, a wedge section of the liver was taken and the spleen was removed. The liver specimen was misinterpreted as diffuse, well-differentiated hepatoma, and chronic passive splenic congestion was observed. Postoperatively the patient suffered from several episodes of sudden transient confusion and lethargy, and intermittent fever continued. 5-Fluorouracil therapy was begun, but the patient died 5 days later. At autopsy, the liver was covered with many closely spaced 1-4 cm nodules, microscopically identified as circumscribed collections of normal appearing hepatocytes without bile ducts or central veins. Of the cases reported in the literature, six patients had Felty's syndrome and 12 had congestive heart failure. Splenomegaly, the absence of jaundice and stigmata of chronic liver disease, and generally normal liver function tests seem to be common characteristics. The elucidation of the pathogenesis and natural history of this disease requires further investigation.

1308 ABNORMALITIES OF CARBAMYL PHOSPHATE SYNTHETASE AND ORNITHINE TRANSCARBAMYLASE IN LIVER OF PATIENTS WITH REYE'S SYNDROME.

(Eng.) Sinatra, F.; Yoshida, T.; Applebaum, M.; Mason, W.; Hoogenraad, N. J.; Sunshine, P. (Stanford Univ. Sch. Medicine, Stanford, CA). *Pediatr. Res.* 9(11):829-833; 1975.

Urea cycle function was evaluated in liver obtained

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from six patients (2 boys and 4 girls) with Reye's syndrome and from five controls to examine the relationship between Reye's syndrome and defects in urea biosynthesis. The Reye's syndrome patients demonstrated normal activities for the extramitochondrial portion of the urea cycle but showed marked abnormalities of carbamyl phosphate synthetase (CPS) and ornithine transcarbamylase (OTC). CPS activity was reduced to less than 15% of control values in all four patients from whom tissue was obtained during the first 72 hr after the onset of encephalopathy. Two patients from whom tissue was not obtained until after 9 days of symptoms showed no reduction in CPS activity. The OTC activity was also reduced (3-67% of control values) in the four patients from whom tissue was obtained early in the illness. In addition, there was greater than 60% reduction in V_{max} and K_m for carbamyl phosphate in all four patients in whom sample size permitted kinetic analysis, including both patients in whom CPS and OTC activity were not markedly reduced. The same kinetic abnormality as well as decreased CPS activity were experimentally produced in normal rat liver incubated in the presence of 1.0 mM 4-pentenoic acid, a short chain fatty acid and known hepatic mitochondrial toxin.

1309 THE LIVER IN HEREDITARY HEMORRHAGIC TELANGIECTASIA (OSLER-WEBER-RENDU DISEASE). (Eng.)

Daly, J. J.; Schiller, A. L. (Massachusetts General Hosp., Boston, MA 02114). *Am. J. Med.* 60(5):723-726; 1976.

Liver involvement in hereditary hemorrhagic telangiectasia was examined in four patients at autopsy. The gross appearance of the liver varied considerably in each case as did historic data concerning bleeding episodes and transfusion exposure. Hepatomegaly was an inconstant clinical finding and hepatic function was little impaired. Liver disease was evident in all cases. The only consistent findings were at the microscopic level. Three overlapping and apparently interrelated histologic patterns dominated; they incorporated varying degrees of prominence in the number, caliber, and tortuosity of vascular channels and were associated with stromal fibrosis that differed in extent and maturity. The composition of all hepatic lesions was accounted for without implicating other disease processes. Also, stigmata characteristic of complicating conditions such as hepatitis and cirrhosis were not observed. Therefore, these random focal fibrovascular lesions may be examples of various possible manifestations along a spectrum of vascular abnormalities that represent hepatic involvement in hereditary hemorrhagic telangiectasia. Theses lesions are probably slow-developing and are relatively innocuous. The importance of distinguishing between hepatic involvement in hereditary hemorrhagic telangiectasia and the various forms of hepatitis and cirrhosis that tend to complicate the condition is emphasized.

1310 HEPATIC VENO-OCCLUSIVE DISEASE IN A RENAL TRANSPLANT PATIENT RECEIVING AZATHIOPRINE.

(E.) Marubbio, A. T.; Danielson, B. (Hennepin County Medical Center, 5th St. and Portland South, Minneapolis, MN 55415). *Gastroenterology* 69(3):739-743; 1975.

The development of hepatic veno-occlusive disease in a 54-yr-old man receiving azathioprine (Imuran) to prevent rejection of a renal homograft is described. The patient presented in 1967 with nephrotic syndrome, hypertension, and moderately reduced renal function, and was diagnosed as having membranous glomerulonephritis (by renal biopsy). In 1972, he received a related-donor kidney; immunosuppressive therapy included methylprednisolone, azathioprine, and antilymphocyte globulin. One yr after transplantation, SGOT was elevated at 65 Karmen U (normal 10-45 Karmen U/ml). The azathioprine dose was decreased to approximately 1 mg/kg/day; prednisolone was continued at 20 mg/day. Fourteen months after transplantation, mild right upper quadrant pain and jaundice developed; 2 months later the patient was admitted for liver biopsy. On histological examination, the liver showed diffuse mid- and centrilobular congestion. The central veins were surrounded by collagen and showed subintimal edema. Centrally, small canalicular bile plugs were present. Azathioprine therapy was discontinued and cyclophosphamide (Cytoxan) was begun (1.25 mg/kg/day). Clinically, fluid retention and ascites developed without any evidence of cardiac failure, proteinuria, or peritonitis. Examination of tissue from the second biopsy, performed 18 months after transplantation, found a striking increase in the previous finding and collagen completely obliterated some central veins. The patient's clinical course was characterized by persistent low grade fever, worsening ascites, and peripheral edema that necessitated readmission 19 months after transplantation. Physical examination revealed an obviously jaundiced patient with marked muscle wasting. A few days later he developed severe dyspnea, fever, and left sided pulmonary infiltrate and died within 12 hr. Several known causes of veno-occlusive disease and the possible causes in this patient are discussed. Based upon the present experience, it is suggested that a liver biopsy be done in such patients if and when the liver chemistries become deranged. If centrilobular necrosis, hemorrhage or fibrosis are seen, discontinuation of immunosuppressive therapy is indicated.

1311 THE KINETICS OF COPPER UPTAKE BY THE LIVER IN WILSON'S DISEASE STUDIED BY A WHOLE-BODY COUNTER AND A DOUBLE LABELLING TECHNIQUE.

(Eng.) Gunther, K.; Lossner, V.; Lossner, J.; Biesold, D. (Dept. Neurochemistry, Karl Marx Univ., Leipzig, Germany). *Eur. Neurol.* 13(5):385-394; 1975.

The hepatic uptake of ^{64}Cu by a normal female control, two clinically healthy subjects regarded as heterozygotes (44-yr-old male and 60-yr-old female), and two patients with Wilson's disease (18-yr-old man and 23-yr-old woman) was measured using a double labeling technique with ^{64}Cu- and ^{51}Cr-labeled RBC to correct for extracellular copper. Special attention was directed towards copper uptake kinetics during the first hour after injection. Two different measuring techniques were employed simultaneously: one collimated Na(Tl) crystal was in a fixed position over the liver, counts being recorded by a single channel analyzer connected to a multichannel analyzer in a multichannel scaling mode. A second collimated crystal made scanning movements along the body axis, counts being recorded by a multichannel analyzer in a multispectrum scaling mode. Curves showing a rapid increase of total ^{64}Cu values by multichannel scaling were similar for the normal control and a heterozygote. The curve for a patient with Wilson's disease showed only a slight increase. The calculated fractions of copper in the blood and in liver tissue, assuming that the head is not a storage area, gave similar curves for the normal control and the heterozygotes, but a decrease in blood copper content and an increase in liver storage were delayed in the patients with Wilson's disease. The heterozygotes stored 70-90% of the copper in the liver in relation to the blood copper content of the liver region; the normal control stored approximately 50%, and the patients with Wilson's disease stored only 15% and 30%. Thus, the use of a double nuclide labeling technique enabled both ^{64}Cu values for an organ to be corrected for the ^{64}Cu blood content, and provided information on the actual dynamic ^{64}Cu movement in the body.

1312 HEPATIC TRAUMA INVOLVING THE HEPATIC VEINS AND VENA CAVA. (Eng.) McMaster, P. (Addenbrooke's Hosp., Cambridge, England). *Injury* 7(4):299-305; 1976.

Five cases (three children and two adults) of major hepatic injuries with involvement of hepatic veins and inferior vena cava are reported. Only one of these patients survived, but death was probably related more to the extensive associated injuries than to the hepatic and caval injuries alone. Massive transfusion was required in each patient with an average of 22 units of blood for each child and 37 for each adult. Most of this blood was needed and used within the first 2-3 hr after admission. Packs may be used temporarily when major hepatic and caval injury is encountered to allow time for the control of hypovolemia. The risk of air embolism and unsatisfactory hepatic transplant experience have increased the need for rapid transfusion and maintenance of an adequate cardiac volume and pressure while the inferior vena cava was occluded. This is an easier procedure in children whose normal blood volume is lower than in adults. The use of this method enabled the technical problems associated with hepatic and caval injuries to be overcome in three of the five patients, although extensive and additional injuries to other systems allowed only one of them to survive. Other possible management and operative techniques to control the massive hemorrhages are discussed.

1313 A CLINICOPATHOLOGIC STUDY OF HEPATIC DYSFUNCTION FOLLOWING SHOCK. (Eng.) Champion, H. R.; Jones, R. T.; Trump, B. F.; Decker, R.; Wilson, S.; Miginski, M.; Gill, W. (Maryland Inst. Emergency Medicine, Baltimore, MD). *Surg. Gynecol. Obstet.* 142(5):657-663; 1976.

An attempt was made to identify a clinicopathologic syndrome of potentially reversible hepatic dysfunction after severe shock. Among 19 patients admitted to a shock-trauma unit, sixteen patients had profound post-traumatic hemorrhage, 2 had nontraumatic hemorrhage and 1 had profound peripheral vascular collapse secondary to refractory increased intracranial pressure. Four died on the first day post-shock, two died within 4 days, and nine died within 13-55 days. Multiple organ failure and infection developed in the four survivors. The existence of post-traumatic hepatic insufficiency syndrome was suggested and was described in three phases: initiation, function impairment, and recovery of hepatic function. Immediately following shock, there was enzymatic and light and electron microscopic evidence of hepatocellular damage, resulting in a jaundice peak on the 8th-10th day. This was followed by repair and regeneration of the liver as well as an increase in cholestatic enzyme levels. Later, bilirubin peaks were noted when hepatocellular function was further decreased or overloaded against this background of dysfunction related to the episode of shock. Hepatic function recovery might continue or might be delayed by intercurrent disease, particularly systemic infection. It is suggested that support of hepatic function, similar to that used for pulmonary and renal failure cases, may be important in altering the prognosis of trauma patients.

1314 LIVER SCAN AS A MEASURE OF LIVER FUNCTION FOLLOWING JEJUNOILEAL BYPASS FOR MORBID OBESITY. (Eng.) Hollenbeck, J. I.; Brown, R. G.; O'Leary, J. P.; Woodward, E. R. (Coll. Medicine, Univ. Florida, Gainesville, FL). *Surg. Forum* 24:402-404; 1973.

1315 SCINTIGRAPHIC EVALUATION OF LIVER METASTASES FROM THYROID CARCINOMA. (Eng.) Woolfenden, J. M.; Waxman, A. D.; Wolfstein, R. S.; Siemsen, J. K. (Univ. Southern California Medical Center, Los Angeles, CA 90033). *J. Nucl. Med.* 16(7):669-671; 1975.

1316 TRAUMA OF THE SPLEEN AND LIVER IN CHILDREN. (Eng.) Hendren, W. H.; Kim, S. H. (Harvard Medical Sch., Boston MA). *Pediatr. Clin. North Am.* 22(2):349-364; 1975.

1317 HEPATIC TRAUMA IN ADULTS. (Eng.) Steichen, F. M. (Univ. Pittsburgh Medical Sch., Pittsburgh, PA). *Surg. Clin. North Am.* 55(2):387-407; 1975.

1318 LIVER GLYCOGENOSIS. A BIOCHEMICAL AND ULTRASTRUCTURAL STUDY. (Eng.) De Bruijn, W. C.; Fernandes, J.; Huber, J.; Koster, J. F. (Medical Faculty, Erasmus Univ., P.O. Box 1735, Rotterdam, Netherlands). *Pathol. Eur.* 10(1):3-15; 1975.

1319 TRAUMATIC SUBCAPSULAR HEMATOMAS OF THE LIVER. (Fre.) Moulay, A.; Vignal, J.; Tissot, E.; Faure, B. (Hopital Edouard-Herriot, 69374 Lyon Cedex 2, France). *Lyon Chir.* 71(4):235-239; 1975.

1320 COMPARISON OF THE EFFECTS OF COMBINED THERAPY OF GASTRIC CARCINOMA ON LIVER FUNCTION. (Rus.) Diakova, A. M.; Androsov, N. S.; Stefani, N. V. (Res. Inst. Medical Radiology, Obninsk, USSR). *Med. Radiol. (Mosk.)* 20(6):35-39; 1975.

1321 CLINICAL ASPECTS OF CARCINOMA OF THE LIVER. (Ger.) Frey, P.; Schmid, M.; Knoblauch, M. (Kantonsspital, CH-8091 Zurich, Ramistr. 100, Switzerland). *Dtsch. Med. Wochenschr.* 100(32): 1625-1629; 1975.

1322 CURRENT CONCEPTS IN THE MANAGEMENT OF PRIMARY LIVER-CELL CARCINOMA. (Eng.) Balasegaram, M. (General Hosp., Kuala Lumpur, Malaysia). *Clin. Oncol.* 1(2):111-120; 1975.

1323 MALIGNANT MIXED TUMOR OF THE LIVER: REPORT OF A CASE AND A REVIEW OF THE LITERATURE. (Eng.) Watanabe, I.; Kasai, M.; Watanuki, T.; Amano, S. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Acta Hepatogastroenterol. (Stutt.)* 22(3): 158-164; 1975.

1324 CLINICAL STUDY OF THE EFFECT OF A PROTEIN-FREE LIVER EXTRACT ON VARIOUS LIVER DISEASES. (Por.) Braun, L.; Gomes, F. B.; Rocha, A.; Costa, L. C. S.; Dacorso, P., Jr. (Hosp. Andarai, I.N.P.S., Rio de Janeiro, Brazil). *Folha Med.* 69(5):525-531; 1974.

1325 PROTHROMBIN-COMPLEX CONCENTRATES IN LIVER DISEASE. (Eng.) Dioguardi, N.; Mannucci, P. M. (3rd Inst. Clinical Medicine, Univ. Milan, Via Pace 15, 20122 Milan, Italy). *Lancet* 2(7926): 188-189; 1975.

1326 ASPECTS OF THE PATHOGENESIS OF CHOLESTASIS OF PREGNANCY WITH REFERENCE TO THE SERUM LIPID ABNORMALITIES. (Eng.) Samsioe, G.; Johnson, P.; Gustafson, A. (Sahlgren's Hosp., Univ. Goteborg, S-413 45 Goteborg, Sweden). *Scand. J. Gastroenterol.* 10:1-4; 1975.

1327 INTRAHEPATIC CHOLESTASIS. (Fre.) Pavel, I. (6, Intrarea Caragiale, Bucarest, Sect. 2, Rumania) *Sem. Hop. Paris* 51(18):1195-1198; 1975.

1328 CHOLESTATIC JAUNDICE. (Ger.) Niederhoff, H.; Sutor, A. H.; Kunzer, W. (Universitats-Kinderklinik, D-7800 Freiburg, Mathildenstr. 1, Germany). *Monatsschr. Kinderheilkd.* 123(7):571-572; 1975.

1329 INTRAVENOUS FEEDING IN HEPATIC FAILURE. (Eng.) Hensle, T.; Blackburn, G. L.; O'Donnell, T.; McDermott, W. V., Jr. (New England Deaconess Hosp., Boston, MA). *Surg. Forum* 24:388-391; 1973.

1330 FATTY ACID COMPOSITION OF SERUM LIPIDS IN BILHARZIAL HEPATIC FIBROSIS AND CHRONIC ACTIVE HEPATITIS. (Eng.) Gabr, Y.; Mahfouz, M.; Mohammed, Y. S. (Medical Res. Inst., Alexandria Univ., Alexandria, Egypt). *Acta Biol. Med. Ger.* 34(1):45-51; 1975.

1331 LIVER FUNCTION IN PATIENTS WITH HODGKIN'S DISEASE DURING TREATMENT WITH CYTOSTATIC AGENTS. (Rus.) Sarnitskii, I. P.; Temnik, I. V. (Kiev Inst. Postgraduate Medicine, Kiev, USSR). *Klin. Khir.* (5):71-72; 1975.

1332 SOME CRITERIA FOR LIVER FUNCTION IN OBESE CHILDREN. (Rus.) Smiian, I. S.; Khodorchuk, N. Ia. (Ternopol Medical Inst., USSR). *Pediatriia* (7):59-61; 1975.

1333 ANALYSIS OF CLOTTING IN REYE'S SYNDROME. (Ger.) Jacobi, H.; Altemeier, K. H.; Kunzer, W. (Univ.-Kinderklinik, D-7800 Freiburg, Mathildenstrasse 1, Germany). *Monatsschr. Kinderheilkd.* 123(7):573-574; 1975.

See also, 0783, 0882, 0894, 0906, 0958, 0964, 0965, 0966, 0977, 0984, 1001, 1002, 1004, 1005, 1006, 1007, 1009, 1010, 1011, 1150, 1166, 1186, 1217, 1263, 1367, 1401, 1409, 1434, 1436, 1529, 1533, 1534.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

1334 INFLUENCE OF EXCHANGE TRANSFUSION ON THE DEVELOPMENT OF SERUM IMMUNOGLOBULINS. (Eng.) Mantalenaki-Asfi, K.; Morphis, L.; Nicolopoulos, D.; Matsaniotis, N. ("St. Sophie's Children's Hosp.," Athens, 608, Greece). *J. Pediatr.* 87(3):396-399; 1975.

The influence of exchange transfusion on the development of immunoglobulin (Ig) G, IgA, and IgM blood levels was studied by radial immunodiffusion in 13 neonates. Twenty-five normal and 13 jaundiced (but not exchange-transfused) age-matched infants were used as controls. A high degree of IgG suppression occurred during the first month of life in the exchange-transfused infants and increased during the third ($p<0.001$), sixth ($p<0.01$), and ninth month ($p<0.02$). IgA synthesis was also suppressed in the exchange-transfused infants until the third month p<0.05). IgM, however, was increased immediately fter the transfusion and remained at a higher evel than that of the controls up to the third p<0.05) and sixth (p<0.05) months. Thus, exchange ransfusion seems to delay the production of the nfant's own IgG persistently for 1 yr, as well as ynthesis of IgA for a short time after birth, hereas it accelerates production of IgM.

335 OXYTOCIN AND NEONATAL HYPERBILIRUBINEMIA. (Eng.) Oski, F. A. (Upstate edical Cent., 750 E. Adams St., Syracuse, NY 3210). *Am. J. Dis. Child.* 129(10):1139-1140; 975.

everal hypotheses to explain the previously oberved link between the use of oxytocin during abor and hyperbilirubinemia among newborn infants re discussed. The relative risk of significant aundice ($\geq$ 10 mg/100 ml) in an infant born after xytocin administration is 1.6 times greater than hat of infants born after spontaneous labor or elivery accompanied by amniotomy. This may be xplained by (a) increased RBC mass in the infant, esulting from the redistribution of blood caused y the stimulation of uterine contractions, (b) lteration of the RBC by the drug, (c) stimulation f heme oxygenase activity, (d) inhibition of lucuronyl transferase activity, or (e) interference ith the normal hepatic maturation process of the nfant.

336 A CLINICAL STUDY ON A PEDIGREE OF FAMILIAL NONHEMOLYTIC JAUNDICE (ROTOR TYPE): III. EPORT OF TWO ADDITIONAL CASES. (Jpn.) Ishikawa, .; Doi, M. (Nara Medical Univ., Kashihara, Japan). *. Nara Med. Assoc.* 25(4/5):418-424; 1974.

he father (43-yr-old) and daughter (18-yr-old) of family with a pedigree of familial nonhemolytic jaundice (Rotor type), were clinically examined for jaundice. Neither of them was bothered by any particular jaundice symptoms, but yellowness was present in the skin and in the whites of the eyes. According to their case histories, yellowing became more pronounced when they were tired. No liver bioassay was taken, but the clinical profile of the father agreed with symptoms of Rotor-type constitutional hyperbilirubinemia: slight jaundice of conjunctiva and skin; icteric index, 9; total bilirubin, 1.3 mg/dl (increase of direct bilirubin); BSP retention rate (30-min value, 32.2%; 60-min value, 11.0%); positive cholecystogram; and a very slight delay in incorporation of ^{131}I-BSP into the liver, according to ^{131}I-BSP scintiphotogram. Although yellowing in the daughter increased with tiredness, test results were normal. The authors conclude that the possible clinical nature of the disease cannot be discounted and follow-up examinations should be conducted in subjects with a pedigree of familial nonhemolytic jaundice.

1337 INTERRELATIONSHIP BETWEEN SERUM ENZYMES AND HYPERBILIRUBINEMIA IN HUMAN SUBJECTS. (Eng.) Jamwal, D. S.; Bandyopadhyay, A. (Medical Coll., Jammu, India). *Indian J. Med. Res.* 64(3): 425-429; 1976.

1338 KINETICS OF SULFOBROMOPHTHALEIN IN NONCONJUGATED HYPERBILIRUBINEMIAS. (Spa.) Herruzo, J. A. S. (Ciudad Sanitaria, Madrid, Spain). *Rev. Clin. Esp.* 136(2):115-122; 1975.

1339 STUDY WITH URIDINE DIPHOSPHOGLUCOSE (UPDG) IN PHYSIOLOGIC HYPERBILIRUBEMIA OF THE NEWBORN. (Por.) Salazar de Sousa, J.; Sanches, N.; Paes, M. V. R. (Dept. Pediatrics, Univ. Lisbon, Lisbon, Portugal). *Minerva Pediatr.* 27(20):1162-1165; 1975.

1340 A NEW CASE OF DUBIN-JOHNSON DISEASE: PATHOLOGICAL AND ULTRASTRUCTURAL STUDY. (Fre.) Giroud, M.; Page, G.; Garrigue, G.; Seigneuric, A.; Cluzeau, C. (Hopital Instruction, Armees Desgenettes, F 69272 Lyon Cedex I, France). *Ann. Med. Interne* 126(10):711-715; 1975.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

1341 ASPIRIN HEPATITIS. (Eng.) Zucker, P.; Daum, F.; Cohen, M. I. (Montefiore Hosp., Medical Center, 111 E. 210th St., Bronx, NY 10467). *Am. J. Dis. Child.* 129(12):1433-1434; 1975.

The case reports of two patients with hepatotoxic reactions associated with long-term salicylate therapy are presented. A 17-yr-old girl with systemic lupus erythematosus and an 11-yr-old boy with sickle cell anemia and rheumatoid arthritis manifested chemical hepatic dysfunction and histopathologic changes when serum salicylate concentrations were at or below those levels usually considered safe (30-40 mg/100 ml and 20 mg/100 ml, resp.). The girl had received 3.6 g/day of aspirin and antacids

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for 42 days, while the boy had received 2.4-3.6 g/day of aspirin and antacids for 4 months. Serum SGOT was elevated in both patients, which reverted to normal after salicylate therapy was discontinued. An attempt to reinstitute therapy but maintain a low serum concentration of salicylate in the second patient resulted in a recurrence of hepatic dysfunction. It appears that any child receiving prolonged salicylate therapy should be observed for chemical evidence of hepatotoxicity regardless of serum salicylate concentrations.

1342 ABSENCE OF CELLULAR HYPERSENSITIVITY IN PATIENTS WITH UNEXPLAINED HEPATITIS FOLLOWING HALOTHANE.

(Eng.) Walton, B.; Hamblin, A.; Dumonde, D. C.; Simpson, R. (London Hosp., London, E1 1BB, England). *Anesthesiology* 44(5):391-397; 1976.

Lymphocyte or leukocyte populations from 16 patients with histories of unexplained post-halothane jaundice were exposed to artificially produced conjugates of trifluoroacetate (TFA) with both human liver specific protein (LSP) and human serum albumin (HSA) to determine the association between halothane and postoperative hepatic dysfunction. Blood was taken from eight patients during the acute phase of illness and from the other eight patients at intervals following recovery. Both lymphocyte transformation and leukocyte migration-inhibition tests were undertaken. Lymphocyte transformation responses to the "antigen" TFA-HSA and to the "antigen control" HSA and responses to TFA-LSP and LSP in concentrations between 0.001 and 100 μg/ml demonstrated that there was no significant stimulation in whole-blood cultures from either patients or controls, compared with the positive responses to 50 μg/ml phytohemagglutinin and 10 μg/ml purified protein derivative of human tuberculin (PPD). It is concluded that TFA-HSA and TFA-LSP are not antigenic at those concentrations. Leukocyte migration-inhibition results provided no evidence for cellular hypersensitivity to either TFA-HSA or TFA-LSP. The *in vitro* correlates of cell-mediated immunity in the patients provide no evidence for the hypothesis that the rare occurrence of hepatic dysfunction following exposure to halothane is a manifestation of cellular hypersensitivity.

1343 INVESTIGATIONS ON D-GALACTOSAMINE HEPATITIS AFTER PRETREATMENT WITH ALPHA-HEXACHLOROCYCLOHEXANE.

(Eng.) Schuchhardt, C.; Reutter, W.; Lesch, R. (Pathologisches Institut der Universitat, Albertstrasse 19, D-78, Freiburg, Germany). *Beitr. Pathol.* 157(1):45-55; 1976.

The partially hepatectomized female Wistar rat model of liver proliferation was studied to determine whether galactosamine produces liver injury, whether it influences the proliferative response induced by α-hexachlorocyclohexane (α-HCH), and whether the latter substance acts on the primary or secondary biochemical response of the liver during galactosamine treatment. Animals were sacrificed 12, 20, 24, 36, 48, or 72 hr after a single dose of 200 mg α-HCH/kg. Others received an additional 1 x 375 mg D-galactosamine HCL (GalN)/kg. Still others received a single dose of α-HCH and, 36 hr later, an additional dose of 375 mg D-^{14}C-galactosamine/kg 45 minutes prior to death. The liver was considerably enlarged and liver cell proliferation was induced following α-HCH administration. The enlargement was based upon both a hypertrophy and a hyperplasia of hepatocytes. These proliferating livers showed only slight hepatitis due to galactosamine. Simultaneous application of galactosamine and α-HCH did not protect the liver from injury. The increase in sorbitol dehydrogenase activity was about 30% that in the galactosamine-treated controls if a time interval of at least 8 hr elapsed between the injection of α-HCH and the application of galactosamine. The increase in liver mass due to α-HCH was reduced after additional application of galactosamine, perhaps due to a delayed increase of the proliferative activity by inhibited protein synthesis. During the first 8 hr after α-HCH treatment, galactosamine inhibited the proliferative activity. It is assumed that the metabolic events necessary for the onset of DNA synthesis are also delayed or inhibited in α-HCH stimulated liver tissue after injection of galactosamine. In contrast, 12 hr after α-HCH treatment, stimulation of DNA synthesis was not influenced by galactosamine, indicating that the synthesis of RNA and specific proteins necessary for the onset of DNA synthesis had advanced so far during the prereplicative period that DNA synthesis could no longer be repressed by galactosamine. The morphological signs o hepatitis did not appear or were very mild while uraci nucleotides were trapped and DNA synthesis was inhibited. Thus, α-HCH acts on the level of the secondary biochemical response to galactosamine.

1344 FULMINANT HEPATITIS AND LYMPHOCYTE SENSITIZATION DUE TO PROPYLTHIOURACIL.

(Eng.) Mihas, A. A.; Holley, P.; Koff, R. S.; Hirschowitz, B. I. (Univ. Alabama Medical Center, Birmingham, AL 35294). *Gastroenterology* 70(5):770-774; 1976.

The case of a 24-yr-old woman who developed fulminant hepatitis and lymphocyte sensitization during treatment with propylthiouracil (200 mg 3x/day) and propranolol (10 mg 4x/day) for hyperthyroidism is presented. Clinical and biochemical recovery followed discontinuation of drug therapy. Liver biopsy disclosed submassive hepatic necrosis. During the acute phase of the disease, lymphocyte transformation studies revealed sensitization of the patient's lymphocytes to propylthiouracil but not to propranolol. Sensitization remained demonstrable 2 months after cessation of the former drug. Lymphocytes obtained from a hyperthyroid patient treated with propylthiouracil without complications failed to show evidence of sensitization. These observations indicate that submassive hepatic necrosis may result from treatment with propylthiouracil and are consistent with the theory that sensitization mechanisms may be responsible for the hepatic injury induced by this drug.

1345 THE ROLE OF THE HUMAN PATHOLOGIST IN THE MANAGEMENT OF DRUG INDUCED HEPATIC INJURY. (Eng.) Popper, H. (Mount Sinai Hosp., New York, NY). *Hum. Pathol.* 6(6):649-652; 1975.

1346 DISULFIRAM HEPATOTOXICITY. (Eng.) Eisen, H. J.; Ginsberg, A. L. (No affiliation given). *Ann. Int. Med.* 83(5):673-674; 1975.

1347 HEPATOTOXICITY OF CHEMOTHERAPY FOLLOWING NEPHRECTOMY AND RADIATION THERAPY FOR RIGHT-SIDED WILMS TUMOR [Letter to Editor]. (Eng.) Jayabose, S.; Shende, A.; Lanzkowsky, P. (Long Island Jewish-Hillside Medical Center, Stony Brook, NY). *J. Pediatr.* 88(5):898; 1976.

See also, 1000, 1012, 1372.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

1348 RELATIONSHIP OF HEPATITIS A ANTIGEN TO VIRAL HEPATITIS. (Eng.) Purcell, R. H.; Dienstag, J. L.; Finestone, S. M.; Kapikian, A. Z. (Natl. Inst. Allergy and Infectious Diseases, Building 7, Room 301, Bethesda, MD 20014). *Am. J. Med. Sci.* 270(1):61-71; 1975.

Recent studies on the relation of hepatitis A antigen (HA Ag) to viral hepatitis are reviewed. HA Ag was associated with 27 nm virus-like particles found in the liver and stools of animals experimentally infected with hepatitis A virus (HAV) as well as in the stools of humans experimentally or naturally infected with HAV. Antigen particles with buoyant density of 1.34 were recovered from the liver, but antigen particles with buoyant densities of 1.32-1.40 were recovered from stools. Antigenically, these particles appear to be related; they are probably HAV. Anti-HA Ag antibody was detected in 100% of convalescent sera from patients who were experimentally or naturally infected with HAV, as demonstrated by immune electron microscopy, but it was not detected in the sera of patients with type B hepatitis or non-B hepatitis. The incidence of anti-HA Ag in normal individuals is approximately 50%, and it increases with age. The temporal relation of HA Ag, anti-HA Ag, and liver damage was studied in experimentally infected chimpanzees and humans. It is concluded that type A hepatitis is not serologically related to experimental hepatitis induced by the GB agent of Deinhardt. HA Ag is not serologically related to the fecal antigen of Cross. In addition to immune electron microscopy, complement fixation and immune adherence tests are applied to the detection of HA Ag and anti-HA Ag.

1349 DEVELOPMENT AND CHIMPANZEE TESTING OF A VACCINE AGAINST HUMAN HEPATITIS B. (Eng.) Buynak, E. B.; Roehm, R. R.; Tytell, A. A.; Bertland, A. U.; Lampson, G. P.; Hilleman, M. R. (Merck Inst. Therapeutic Res., West Point, PA 19486). *Proc. Soc. Exp. Biol. Med.* 151(4):694-700; 1976.

The development and evaluation in chimpanzees of a vaccine against hepatitis B or serum hepatitis is described. Highly purified hepatitis B virus surface antigen (Australia antigen) was used to prepare hepatitis B vaccine. Eighty-nine percent of the plasma was from hepatitis B type *ad* donors and 11% from type *ay* donors. The purified antigen was treated with formalin. Conventional safety and sterility tests ruled out possible contamination with exogenous microbial and viral agents in the vaccine, and tests in marmosets ruled out possible contamination with human hepatitis A virus. The vaccine proved very active in inducing antibody against hepatitis B antigen in guinea pigs, monkeys, and chimpanzees. A dose-response curve was obtained for each species. Most vaccinated animals developed antibody against the antigen after three doses of the vaccine containing up to 20 μg of hepatitis B antigen/dose, given 2 weeks or 1 month apart. The vaccine was highly protective in preventing hepatitis in chimpanzees that were challenged by i.v. injection of human hepatitis B virus. All of the six vaccinated chimpanzees were protected against development of antigenemia following challenge with the living virus and none showed complement-fixing antibody against core antigen. The findings may be valuable for the practical control of hepatitis B by highly purified viral antigen vaccine.

1350 DEVELOPMENT AND UTILIZATION OF COMPLEMENT-FIXATION AND IMMUNE ADHERENCE TESTS FOR HUMAN HEPATITIS A VIRUS AND ANTIBODY. (Eng.) Hilleman, M. R.; Provost, P. J.; Miller, W. J.; Villarejos, V. M.; Ittensohn, O. L.; McAleer, W. J. (Merck Inst. Therapeutic Res., West Point, PA 19486). *Am. J. Med. Sci.* 270(1):93-98; 1975.

Complement-fixation (CF) and immune adherence (IA) assays for hepatitis A antigen and antibody were developed as a result of the successful propagation of CR326 strain of human hepatitis A virus in *Saguinus mystax* marmoset livers. Serologic findings in several cases of human infections indicated the development of IA, CF, and neutralizing antibodies in cases of hepatitis A but not in cases of hepatitis B. Hepatitis A antibody appeared after the onset of the disease and persisted for as long as 7 yr. Epidemiological studies using the IA and CF assays were conducted among several Costa Rican families with outbreaks of hepatitis and among several populations in the United States. In Costa

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Rica, there was a high incidence of hepatitis A at an early age, while the incidence of hepatitis A antibody among adults in the United States was relatively low. Human immunoglobulins can be standardized for hepatitis A antibody content by the IA assay. Both assays may be useful for detecting hepatitis A virus during virus propagation in cell culture in the laboratory.

1351 RISKS OF HEPATITIS: WHAT CAN BE DONE [LETTER TO THE EDITOR]? (Eng.) Whalen, G. E. (Veterans Admin. Hosp., 500 West National Ave., Wood [Milwaukee], WI 53193). *Gastrointest. Endosc.* 22(1):48-49; 1975.

The potentially high risk of contracting hepatitis among endoscopists and laboratory personnel is discussed. It is suggested that endoscopists and their nurses wear gloves during the procedure and that all patients be treated as potential carriers since screening is impossible. Biopsy forceps should be sterilized between procedures, but this is not feasible for endoscopes. Thorough cleaning of the latter with Betadine® should be sufficient to remove most bacteria.

1352 DISINFECTION OF ENDOSCOPIC INSTRUMENTS [Letter to Editor]. (Eng.) Glouberman, S. (Letterman Army Medical Center, Presidio of San Francisco, CA 94129). *Gastrointest. Endosc.* 22(1): 48; 1975.

To determine whether activated glutaraldehyde is effective in disinfecting endoscopes against viruses, Cidex (activated glutaraldehyde 2%) was added to HBAg positive serum and was incubated for 30 min to 1 week. Radioimmunoassay revealed that the treated sera remained positive for HBAg, indicating that the antigenicity of HBAg was not altered. Heating, acidification or alkalinization, or exposure to pepsin, trypsin, lysozyme, or pancreatic lipase also did not change the antigenicity of HBAg. Previous studies have demonstrated that there may not be a relation between infectivity of the virus and immunologic reactivity. Therefore, it is conceivable that in the Cidex-treated serum, the virus is inactivated.

1353 TISSUE AND ORGAN CULTURE STUDIES OF HEPATITIS B VIRUS. (Eng.) Zuckerman, A. J. (London Sch. Hygiene and Tropical Medicine, Keppel St., London, WCIE 7HT, England). *Am. J. Med. Sci.* 270(1):197-204; 1975.

Studies of tissue and organ culture of hepatitis B antigen (HBAg) are reviewed. By specific attachment of fluorescent antibody to HBsAg and HBcAg, progressive noncytocidal involvement of normal cytoplasmic and nuclear components of cultured liver cells was demonstrated, following inoculation of the cultures of human origin with known infective sera and with clinical material. Particles similar to, if not identical with, the core of the 42 nm hepatitis B Dane particle were demonstrated electron microscopically after several passages in a human diploid cell line derived from liver biopsies from hepatitis from HBAg-negative children after inoculation of cultures with HBV. HBsAg may be produced infrequently in inoculated liver organ cultures, but serial passage has not yet been achieved. However serial passage was achieved in fragments of human embryo liver cultivated on the chorioallantoic membrane of the developing chick embryo. Hepatocytes of cultured explants of liver biopsies from children with chronic HB antigenemia contained intranuclear virus-like particles. Further studies are necessary to determine whether cultivation of hepatitis B virus can be established firmly in readily available cell and organ cultures.

1354 VIRAL HEPATITIS, TYPE B, IN EXPERIMENTAL ANIMALS. (Eng.) Barker, L. F.; Maynard, J. E.; Purcell, R. H.; Hoofnagle, J. H.; Berquist, K. R.; London, W. T. (Bureau of Biologics, 8800 Rockville Pike, Bethesda, MD 20014). *Am. J. Med. Sci.* 270(1):189-195; 1975.

The use of the chimpanzee as a model for hepatitis B virus (HBV) infection is reviewed. This species provides a highly sensitive system for experimental type B hepatitis. With rare exceptions, inoculation of sero-negative chimps with materials containing infectious HBV produces serologic evidence of infection including appearance of circulating hepatitis B surface antigen (HB_sAg) and subsequent development of antibody to HB_sAg and hepatitis B core antigen. Serum enzyme elevations indicative of liver damage have occurred in 31 of 46 animals infected. The antigenic subtypes of HBV in the inocula breed true in the infected animals, and HBV titers of sera containing the adw and ayw subtypes have been established as $10^{7.5}$ infectious units/ml. Rhesus monkeys appear to be less sensitive than chimps, and do not develop evidence of liver damage.

1355 HEPATITIS B ANTIGEN SUBTYPES--HISTORY, SIGNIFICANCE, AND IMMUNOGENICITY. (Eng.) Holland, P. V. (Building 10A, Room 1E-33, Natl. Inst. Health, Bethesda, MD 20014). *Am. J. Med. Sci.* 270(1):161-171; 1975.

Subtypes of hepatitis B surface antigens (HBsAg) are reviewed. Heterogeneity of HBsAg was first demonstrated on agar gel diffusion. Subsequent studies revealed that the group of HBsAg has a group reactive determinant, *a*, plus additional specificities that are not universally present on all antigens. At present, four subtypes are recognized: HBsAg/*adw*, HBsAg/*ayw*, HBsAg/*adr*, and HBsAg/*ayr*. The subtype specificities are viral-determined characteristics and are not host properties. Presently, subtypes are used primarily as epidemiological tools. The subtypes may or may not represent different strains of viral hepatitis type B, may play a role in vaccine development, and may indicate which patients with acute disease will develop fulminant or chronic disease states. Current work on HBsAg subtypes is limited by the ability to find or produce antibodies to other than the *a* or group reactive determinant. The other determinants appear to be less immunogenic than *a*.

1356 ANTIBODY TO HEPATITIS B CORE ANTIGEN.

(Eng.) Hoofnagle, J. H.; Gerety, R. J.; Barker, L. F. (Bureau of Biologics, 8800 Rockville Pike, Bethesda, MD 20014). *Am. J. Med. Sci.* 270(1): 179-187; 1975.

Immunologic responses to viral hepatitis type B (HBV) are reviewed. Two distinct antigen-antibody systems were demonstrated: hepatitis B surface antigen (HBsAg) and antibody (anti-HBs) and hepatitis B core antigen (HBcAg) and antibody (anti-HBc). Three types of serologic response patterns to infection were observed. In the typical patient, HBsAg appears in the serum several weeks after exposure, followed by the appearance of clinical symptoms, and subsequently clearance of HBsAg and development of anti-HBs with clinical recovery. This response of transient HBsAg reactivity is characteristic of 70% of the adult patients. Most patients with transient HBsAg develop anti-HBc. In the chronic carrier state, developing in approximately 5% of the patients, high titers of anti-HBc appear after the development of HBsAg in the serum. In about 25% of patients, serologic response to HBV infection is characterized by the appearance of anti-HBs several weeks after exposure without the presence of HBsAg. Generally, individuals with this type of response do not develop clinical symptoms. Titers of anti-HBc begin to fall with recovery from HBV infection, and anti-HBc appears to be shorter lived than anti-HBs. The authors conclude that anti-HBc testing is important in documenting the occurrence of infection with HBV and is of great value in epidemiologic studies and in evaluating the safety and efficacy of hepatitis B immune globulin and HBV vaccines.

1357 e ANTIGEN IN ACUTE HEPATITIS B. (Eng.)

Norkrans, G.; Magnius, L.; Iwarson, S. (Univ. Goteborg, East Hosp., S-416 85 Goteborg, Sweden). *Br. Med. J.* 1(6012):740-742; 1975.

Ninety patients with acute viral hepatitis type B were studied to examine the association between e antigen and hepatitis B surface antigen (HBs Ag). e Antigen was present in 24 patients; they had detectable levels of HBs AG for significantly longer than did the 66 with no e antigen in their serum. The HBs Ag subtypes D (adw) and (ayw) were similarly distributed among patients with e antigen and among those without. The results of biochemical liver function tests showed no differences between the two groups during the acute phase of illness. Three of the five patients who developed clinical and histological signs of chronic liver disease were positive for e antigen, a finding that supports the hypothesis that the e antigen has a prognostic value in hepatitis B.

1358 GROUND-GLASS HEPATOCYTES IN UNSELECTED LIVER BIOPSIES. ULTRASTRUCTURE AND RELATIONSHIP TO HEPATITIS B SURFACE ANTIGEN. (Eng.)

Winckler, K.; Junge, U.; Creutzfeldt, W. (Medizinische Universitatsklinik, 34 Gottingen, W. Germany). *Scand. J. Gastroenterol.* 11(2):167-170; 1976.

Four hundred unselected liver biopsy specimens were stained with aldehyde-thionin (AT) and examined for ground-glass hepatocytes (GGH). Twenty-eight biopsy specimens containing AT-positive GGH were found in the 61 specimens from hepatitis B surface antigen (HB_sAg)-positive patients, but were never seen in HB_sAg-negative patients. AT-positive GGH were observed in healthy HB_sAg carriers (6/8 biopsies) and in all forms of chronic hepatitis (7/12 with chronic persistent and 8/13 with chronic aggressive hepatitis) but never in acute HB_sAg-positive hepatitis. AT-negative GGH were occasionally seen in HB_sAg-negative patients under drug treatment. Ultrastructurally, GGH showed proliferation of smooth endoplasmic reticulum (SER) that only in AT-positive GGH contained filaments (20-25 nm in diameter) within its cisternae. The results support the hypothesis that there are two different types of liver cells in unselected liver biopsies with similar appearance in conventionally stained sections: AT-positive GGH with filaments in their proliferated SER occurring in HB_sAg-positive patients and AT-negative GGH without filaments occurring in HB_sAg-negative patients under drug treatment.

1359 NUCLEAR BODIES IN THE HEPATIC PARENCHYMAL CELLS IN ACUTE VIRAL HEPATITIS. (Eng.)

Soares, J. O.; de Moura, M. C. (Unidade de Microscopia Electronica, Faculdade de Medicina, Lisboa, Portugal). *Experientia* 31(10):1210-1212; 1975.

Nuclear bodies were detected by electron microscopy in approximately 15% of nucleus actions in the hepatocytes of six patients with acute viral hepatitis. One to four nuclear bodies were found per nucleus, with no differences in frequency or morphology of the bodies in three hepatitis B surface antigen (HBsAg)-positive and three HBsAg-negative patients. The findings of nuclear bodies in hepatitis B as well as in hepatitis A suggest that their presence is probably more related to the viral agent as an "inductor" factor rather than to the type of hepatitis virus. The observations suggest that these structures may express liver cell hyperactivity related to the cellular regeneration after hepatic necrosis, and may also be a reflection of the underlying acute viral process.

1360 MECHANISMS RESPONSIBLE FOR DEFECTIVE HUMAN T-LYMPHOCYTE SHEEP ERYTHROCYTE ROSETTE FUNCTION ASSOCIATED WITH HEPATITIS B VIRUS INFECTIONS.

(Eng.) Chisari, F. V.; Routenberg, J. A.; Edgington, T. S. (Scripps Clinic and Res. Foundation, La Jolla, CA 92037). *J. Clin. Invest.* 57(5):1227-1238; 1976.

The expression of selected lymphocyte surface-membrane markers was evaluated in 37 patients with acute viral hepatitis B. Bone marrow-derived (B) lymphocytes were identified by reference to surface immunoglobulin, whereas normal thymus-derived (T) lymphocytes were assayed by their capacity to form spontaneous nonimmune rosettes with sheep RBC (E rosettes, ER). During the acute and resolving phases of viral hepatitis B, the relative and absolute number of ER-

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positive lymphocytes was significantly reduced, whereas the number of surface immunoglobulin-positive lymphocytes and the absolute lymphocyte count remained normal. This resulted in the appearance of a third population of cells, deficient in both surface immunoglobulin and ER markers, and accounting for nearly 25% of peripheral blood lymphocytes. Depression of the number of ER-positive lymphocytes occurred in 55 of 67 individual assays of the 37 cases. Lymphocytes from some patients reacquired ER function when cultured in fetal calf serum but not in the presence of autologous serum, which was capable of suppressing ER function of lymphocytes from normal donors. The extrinsic suppression of ER function by a serum factor (designated as the rosette inhibitory factor), was characterized by a 4 hr latent period and required approximately 18 hr for maximum attenuation of ER function. The serum rosette inhibitory factor was: (a) heat and freeze-thaw stable, (b) nondialyzable, (c) physically separable from hepatitis B surface antigen, (d) not a lymphocytotoxic antibody, and (e) the same buoyant density as a lipoprotein. This extrinsic mechanism was observed in 41.8% of patients with reduced numbers of ER-positive lymphocytes. The rosette inhibitory factor was not detectable in the serum of the remaining 58.2% of the cases of acute and resolving viral hepatitis B despite the presence of reduced numbers of ER-positive lymphocytes. The mechanisms responsible for the suppression of normal ER function in these cases appear to be intrinsic to the lymphocytes and not the result of a humoral factor, because the lymphocytes did not reacquire ER function in the absence of autologous serum. Both intrinsic and extrinsic suppression of T lymphocyte ER function occurred during the first 4 weeks of acute viral hepatitis B. Nine of the 10 patients followed serially continued to manifest defective ER function at 12 weeks. However, the intrinsic defect was observable only in those patients whose liver disease had resolved or was resolving, whereas the extrinsic defect was observed only in two patients with biochemical and histological evidence of unresolved hepatitis.

1361 VIRAL HEPATITIS: CLINICAL ASPECTS. (Eng.) Redeker, A. G. (Univ. Southern California Sch. Medicine, Los Angeles, CA 90007). *Am. J. Med. Sci.* 270(1):9-16; 1975.

The clinical features of viral hepatitis are reveiwed. Acute viral hepatitis usually resolves without sequelae. Fulminant hepatitis, the least common complication of acute hepatitis, is highly lethal, although 20-25% of patients survive. Hepatic failure after 1-3 months of illness is referrred to as subacute (fatal) hepatitis. Ascites due to portal hypertension is common, and at necropsy, submassive hepatic necrosis is usually found rather than the massive necrosis associated with fulminant hepatitis. Two categories of chronic hepatitis are defined: persistent (viral) hepatitis is the benign form, characterized by inflammatory changes in biopsy material, and chronic active hepatitis is a more serious form, which may terminate in hepatic failure. Persistent hepatitis is the most common long-term sequela of acute viral hepatitis. Serum aminotransferases are frequently elevated, but jaundice is not characteristic. Persistent hepatitis may follow both type B and non-B diseases with a frequency of 10-12% and it may appear after complete resolution or late clearance of hepatitis B surface antigen (HBsAg). Chronic active hepatitis embraces both viral and nonviral forms. Jaundice may or may not be present, and episodic jaundice is usually accompanied by large increases in serum transaminases. Chronic active hepatitis sometimes progresses to cirrhosis. Chronic HBsAg is more frequent after initial anicteric hepatitis than after initial icteric hepatitis. In a series of 429 patients with acute icteric type B hepatitis, chronic HBsAg was associated with persistent hepatitis in 6.9% and with chronic active hepatitis in 3%. The persistence of HBsAg for more than 3 months may represent a life-long carrier state.

1362 EPIDEMIC HEPATITIS B: A SUSTAINED OUTBREAK IN A LARGE MILITARY POPULATION. (Eng.) Allen, A. M.; Irwin, G. R.; Karwacki, J. J.; Warren, D. C.; Levine, R. S. (Walter Reed Army Inst. Res., Washington, DC 20012). *Am. J. Epidemiol.* 102(6): 545-552; 1975.

A sustained outbreak of viral hepatitis at an Army base in Texas between January 1971 and June 1973 is described. The epidemiologic investigation was conducted in three phases: initial inquiries, a chart review, and a case control study. There were 792 admissions, but no deaths recorded in a military population of 35,000. Cases were sporadic, with highest attack rates in low ranking soldiers with disciplinary problems. A total of 29% of patients had histories of i.v. drug use within 6 months prior to hospitalization; many of the others had close personal contact with jaundiced persons. Of 505 patients tested by counterelectrophoresis, 31% were seropositive for hepatitis B surface antigen (HBsAg). There were marked differences in rates of exposure to jaundiced persons and shared needles between 38 hepatitis patients and 34 controls. Subtype *ayw* was present in 16/17 antigenemic cases. Seven of nine HBsAg negative cases were antibody positive 3 months later. It is concluded that the epidemic was caused by parenteral drug abuse and personal contact with drug users.

1363 HEPATITIS IN MARMOSETS. (Eng.) Deinhardt, F.; Peterson, D.; Cross, G.; Wolfe, L.; Holmes, A. W. (Rush-Presbyterian-St. Luke's Medical Center, 1753 West Congress Parkway, Chicago, IL 60612). *Am. J. Med. Sci.* 270(1):73-80; 1975.

Studies of the infection of marmosets with human hepatitis A virus (HAV) are reviewed. Some marmoset species [*Saguinus mystax, S. fuscecollis, S. (Oedipomidas) oedipus,* and *Callithrix jacchus,* in order of susceptibility] are susceptible to HAV by either oral or parenteral routes. At least two types of HAV were isolated from marmosets, the two agents having different chemical and antigenic characteristics. Prototypes MS-1 and CR-326 hepatitis strains appear identical, are neutralized by human convalescent sera and pooled immunoglobulin, and result in cross-reacting antibodies. Strain GB appears not to crossreact serologically with MS-1 or CR-326, nor is it neutralized by convalescent sera. GB may be associated with the recently defined type of hepatitis termed hepatitis C or hepatitis non-A/non-B. After repeated challenge, some immune animals develop hyperergic responses with diffuse liver necrosis, and it is suggested that this be considered in future vaccination studies.

1364 EXTRAHEPATIC MANIFESTATIONS OF VIRAL HEPATITIS.

(Eng.) Gocke, D. J. (Rutgers Medical Sch., Piscataway, NJ 08854). *Am. J. Med. Sci.* 270(1):49-52; 1975.

Extrahepatic manifestations of viral hepatitis are reviewed. Three types of syndrome are recognized, a serum sickness-like prodrome of acute hepatitis, polyarteritis nodosa with hepatitis B infection, and glomerulonephritis, also associated with hepatitis B. The serum sickness-like prodrome is characterized by rash, urticaria, polyarthralgia, and sometimes acute arthritis; it occurs in about 15-20% of hepatitis patients (B and non-B). It occurs from 1 to 6 weeks before the onset of icterus and lasts for 2-7 days. Circulating HBsAg-IgM and IgG are often present. Polyarteritis nodosa begins with fever, polyarthralgia, myalgia, rash, and urticaria, and it progresses to peripheral neuropathies, hypertension, eosinophilia, hematuria and azotemia. Fibrinoid necrosis and perivascular inflammation occur in the walls of small arteries. Circulating HBsAg is present. Glomerulonephritis occurs in individuals with chronic active hepatitis and persistent HBs antigenemia. It is usually of the membranous or membranoproliferative type. It is concluded that hepatitis viruses may produce a variety of extrahepatic manifestations in which the mechanism of pathogenesis involves an immunologic process rather than direct viral invasion and cytopathogenicity.

1365 DISORDERED GUSTATORY ACUITY IN LIVER DISEASE.

(Eng.) Smith, F. R.; Henkin, R. I.; Dell, R. B. (Columbia Univ. Coll. Physicians and Surgeons, New York, NY 10032). *Gastroenterology* 70(4):568-571; 1976.

Subjective and objective abnormalities of gustatory function, including decreased taste acuity (hypogeusia), were studied in 22 patients with acute viral hepatitis and 16 patients with chronic liver disease. The chronic liver disease patients included nine with alcoholic cirrhosis, five with postnecrotic cirrhosis, and two with chronic active hepatitis. The patients with acute viral hepatitis, chronic active hepatitis, and with cirrhosis showed subjective and objective disturbances of gustatory function when compared with a normal population. In patients with early hepatitis and with chronic liver disease, the magnitude and uniformity of the threshold elevations were comparable, implying that disordered gustatory function is concomitant with disordered hepatic function. Patients with acute hepatitis showed a significant decrease in taste thresholds (improvement in acuity) as the hepatitis waned, indicating that the gustatory defect is reversible. It is unlikely that copper flux was related to the reversible hypogeusia as changes in serum copper in patients with acute viral hepatitis were insignificant during recovery. Changes in serum zinc and in the concentrations of the components of the plasma retinol transport system were significant; however, no clear correlation was found with measurements of gustatory acuity. Bilirubin, SGOT, and alkaline phosphatase concentrations did not show a relation with measurements of gustatory acuity. The loss of appeal to food may result in a lessening of the impetus to eat. Dysgeusia and hypogeusia along with nausea may be major factors in the anorexia commonly noted in patients with hepatic disease.

1366 FULMINANT SERUM HEPATITIS AND MENINGOCOCCIC MENINGITIS.

(Eng.) Tri, T. B. (Letterman Army Medical Center, Presidio of San Francisco, CA 94129). *JAMA* 234(8):851-852; 1975.

The case report of a 17-yr-old boy who contracted concomitantly fulminant serum hepatitis and meningococcic meningitis is presented. The patient was first observed with fever, arthralgia, and a rash. A counterelectrophoresis test for hepatitis-associated antigen was positive, and increased levels of bilirubin, alkaline phosphatase, lactic dehydrogenase, and SGOT were evident. There was approximately a 10-day delay in the onset of symptoms characteristic of meningitis (i.e., leukocytosis, stupor, and increase in cerebrospinal fluid pleocytosis), supporting the theory that meningitis developed after the onset of hepatitis. The author contends that the patient acquired the nasopharyngeal meningococcal carrier state first; the development of fulminant hepatitis then facilitated the dissemination of meningococci, resulting in the development of meningitis.

1367 HEPATITIS B SURFACE ANTIGEN AND LIVER CELL CARCINOMA.

(Eng.) Williams, A. O. (Dept. Pathology, Univ. Ibadan, Ibadan, Nigeria). *Am. J. Med. Sci.* 270(1):53-56; 1975.

The geographic distribution of the incidence of hepatitis B surface antigen HBsAg is discussed in relation to the incidence of macro- and micronodular cirrhosis and liver cell cancer. High frequencies of HBsAg were observed among healthy populations living in areas (sub-Saharan Africa and the Far East) where there is a high incidence of liver cell cancer and of macronodular cirrhosis, which is frequently complicated by liver cancer. Conversely, low incidences of HBsAg were reported from areas with low incidences of liver cell cancer. Liver cell cancer patients showed a higher incidence of HBsAg than among comparable controls. There is inadequate information on the incidence of HBsAg in liver cell cancer patients. No correlations between the subtypes of HBsAg and liver cancer were observed, nor was there a correlation between HBsAg and α-fetoprotein in liver cell cancer. HBsAg is not common in patients with micronodular cirrhosis with or without complicating liver cancer. It is suggested that HBsAg is necrogenic in the liver and

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is capable of producing hepatic necrosis or hepatitis that may then progress to macronodular cirrhosis or to neoplasia. Possible factors that may influence progression to cirrhosis include malnutrition, immunologic status, age, and viral virulence. Longitudinal studies of carriers may help to elucidate the role of HBsAg in the pathogenesis of liver cell cancer.

1368 CHRONIC LIVER DISEASE DEVELOPING AFTER OUTBREAK OF HBsAg-NEGATIVE HEPATITIS IN HAEMODIALYSIS UNIT. (Eng.) Galbraith, R. M.; Portman, B.; Eddleston, A. L. W. F.; Williams, R.; Gower, P. E. (King's Coll. Hosp., London, SE5 8RX, England). *Lancet* 2(7941):886-890; 1975.

The immunological and histological abnormalities of eight patients with persistently raised serum aminotransferase levels since an outbreak of acute hepatitis in a hospital hemodialysis unit (1968-1970) are reported. After the outbreak, patients were screened regularly and standard biochemical tests of liver function were completed at least every 3 months. Sera were examined for hepatitis B surface antigen (HBsAg) by solid phase radioimmunoassay. Cellular immunity was investigated using the leukocyte migration test with HBsAg as antigen. Liver biopsies of seven patients disclosed chronic aggressive hepatitis in three, with two of the three also having advanced cirrhosis. Chronic persistent hepatitis was present in two others, and the remaining two had nonspecific hepatitis in association with massive iron overload. A higher frequency of cellular immunity to HBsAg was observed in patients who previously had acute hepatitis; however, the prevalance of humoral antibody was similar to that of subjects who had never had acute hepatitis. The high prevalence of anti-HBs in these patients (30% as compared with 7% in healthy controls) may reflect the greater exposure to hepatitis B virus, and is similar to that reported in a healthy laboratory staff handling HBsAg positive material.

1369 VIRAL HEPATITIS B IN THE MEDICAL STAFF OF A HOSPITAL: A STUDY OF 82 CASES. (Fre.) Veyre, B.; Brette, R. (Hopital Edouard-Herriot, F 69374 Lyon Cedex 2, France). *Arch. Fr. Mal. App. Dig.* 64(1):11-20; 1975.

1370 A FOLLOW-UP OF VIRAL HEPATITIS MORBIDITY IN CZECHOSLOVAKIA [Abstract]. (Cze.) Cervenka, J. (Res. Inst. Epidemiology, Microbiology, Bratislava, Czechoslovakia). *Bratisl. Lek. Listy* 60(5):540; 1973.

1371 SPECIFIC IMMUNE ADHERENCE ASSAY FOR HUMAN HEPATITIS A ANTIBODY: APPLICATION TO DIAGNOSTIC AND EPIDEMIOLOGIC INVESTIGATIONS. (Eng.) Miller, W. J.; Provost, P. J.; McAleer, W. J.; Ittensohn, O. L.; Villarejos, V. M.; Hilleman, M. R. (Merck Inst. Therapeutic Res., West Point, PA 19486). *Proc. Soc. Exp. Biol. Med.* 149(1):254-261; 1975.

1372 A GOOD APPROACH TO THE TREATMENT OF LIVER DISEASE. (Fre.) Passeron, J.; Bouvier, J.-B. (C.H.U. Kremlin-Bicetre, 78, rue du General Leclerc, 94000 Le Kremlin-Bicetre, France). *Sem. Hop. Ther.* 50(9):595-598; 1974.

1373 WHAT GOOD IS DIET THERAPY IN CHILDHOOD HEPATITIS? (Ger.) Lucking, Th. (Medizinische Hochschule, D-3000 Hannover-Kleefeld, Karl-Wiechert-Allee 9, Germany). *Monatsschr. Kinderheilkd.* 123(8):628-629; 1975.

1374 WHAT GOOD IS MEDICAL TREATMENT OF CHILDHOOD HEPATITIS? (Ger.) Ortlieb, R. (Krankenhauszweckverbands, D-8900 Augsburg, Neusaesserstr. 47, Germany). *Monatsschr. Kinderheilkd.* 123(8):626-627; 1975.

1375 PATHOLOGICAL ANATOMY OF HEPATITIS IN CHILDHOOD. (Ger.) Kossling, F. K. (Pathologisches Inst., Kliniken Freien Hansestadt, D-2800 Bremen, St.-Jurgen-Str., Germany). *Monatsschr. Kinderheilkd.* 123(8):604-608; 1975.

1376 HEPATITIS B VIRUS INFECTION AND LIVER LESIONS ASSOCIATED WITH IT IN CHILDREN WITH DIABETES MELLITUS. (Rus.) Barashkova, N. N.; Lozovskaia, L. S.; Sapelkina, L. V. (N. I. Pirogov 2nd Moscow Medical Inst., Moscow, USSR). *Vopr. Okhr. Materin. Det.* 20(7):23-26; 1975.

1377 NEW FINDINGS ON HEPATITIS B ANTIGEN (AUSTRALIA ANTIGEN). (Ger.) Seidl, S. (Institut Immunhamatologie, Universitat Frankfurt/Main, D-6000 Frankfurt/Main, Sandhofstr. 1, Germany). *Monatsschr. Kinderheilkd.* 123(8):617-620; 1975.

1378 DYNAMICS OF HEPATITIS B ANTIGEN AND ANTIBODY COMPLEMENT-FIXATION TITRES IN THE BLOOD SERUM OF PATIENTS WITH HEPATITIS B [Abstract]. (Eng.) Hollos, I.; Palfi, A. (Natl. Inst. Public Health, Budapest, Hungary). *Acta Microbiol. Acad. Sci. Hung.* 22(3):338; 1975.

1379 HBAg ASSOCIATED PARTICLES IN THE SERA AND THE LIVER OF ASYMPTOMATIC CARRIERS [Abstract]. (Eng.) Yamada, G.; Kobayashi, T.; Ohta, Y.; Kosaka, K. (Okayama Univ. Medical Sch., Okayama, Japan). *Nihon Rynsho Denshi Kenbikyo Gakkai-Shi* 7(3/4):368-369; 1974.

1380 HEPATITIS B ANTIGEN, ALPHA$_1$ FETOPROTEIN AND LIVER DISEASE IN THE EASTERN HIGHLANDS OF PAPUA NEW GUINEA. (Eng.) Clarke, C. W.; Woodfield, D. G. (Goroka General Hosp., Goroka, Papua New Guinea). *Trop. Geogr. Med.* 27(1):52-58; 1975.

1381 THROMBOCYTOPENIA COMPLICATING INFECTIOUS HEPATITIS. (Eng.) Laursen, H. B. (Medical Dept. P, Centralsygehuset, Randers, Denmark). *Acta Hepatogastroenterol. (Stuttg.)* 22(2):102-105; 1975.

See also, 1337, 1387, 1406, 1515.

LIVER AND BILIARY TRACT

Chronic Hepatitis

1382 CHRONIC ACTIVE HEPATITIS: AETIOLOGICAL CONSIDERATIONS BASED ON CLINICAL AND SEROLOGICAL STUDIES. (Eng.) Dietrichson, O. (Kommunehospitalet, DK-1399 Copenhagen K, Denmark). *Scand. J. Gastroenterol.* 10(6):617-624; 1975.

The incidence and degree of clinical, biochemical, and immunological variables of 85 patients with chronic aggressive hepatitis were analyzed from Danish hospital records collected over a 7-yr period. A frequent association with other diseases was observed; autoimmune disorders occurred in 17 patients. Immunoglobulin (Ig) G was elevated in two/thirds of the patients, while IgA and IgM were generally within the normal limits. Australia (Au) antigen was demonstrated in 19/77 patients. None of the patients had simultaneous occurring Au antigen and circulating autoantibodies (ANF, SMA, and MA). Ten patients had neither Au antigen nor circulating autoantibodies. In the group with autoantibodies, there were more patients with autoimmune disorders among their relatives and with nonhepatic diseases and regular prolonged intake of oxyphenisatin than compared with the Au antigen positive group. The average values for transaminases, bilirubin, IgG, and IgA were significantly higher and serum albumin significantly lower in the patients with ANF and SMA than in those with Au antigen. The increased IgG and IgA values in patients with circulating autoantibodies suggest that immunological factors may be of etiological importance in chronic active hepatitis. Eight of 19 patients with circulating autoantibodies reacted with an increased biochemical activity to an oxyphenisatin challenge, suggesting that this drug may be the primary cause of liver damage in some cases.

1383 THE CONCEPT OF AUTOIMMUNE LIVER DISEASE. (Eng.) Mackay, I. R. (Royal Melbourne Hosp., Victoria, Australia). *Bull. N.Y. Acad. Med.* 52(4):453-465; 1976.

A historical background of the pathogenesis of autoimmune liver disease is presented, and common questions on autoimmunity in disease are discussed. These include: implicating autoimmunity as a direct cause of human disease; defining specific criteria for a disease to be considered autoimmune; detailing how damage is effected in autoimmune disorders; and outlining the manner in which autoimmune states are created, with reference to the forbidden clones theory, cross-reactivity, viral infection, drug allergy, failure of suppressor T cells, genetics, and autoimmune responses. Chronic active hepatitis is recognized as a disease process characterized by a relapsing course, progressive inflammatory destruction of liver cells culminating in cirrhosis, autoimmune serological reactions, and responsiveness to corticosteroid drugs. It is suggested that these are subsets of chronic immunopathic diseases of the liver with degrees of overlap and a common tendency to progress to cirrhosis. The immunopathic stimuli appear to differ among the subsets. It is further suggested that lupoid hepatitis is a candidate autoimmune disease. However, the immunogen responsible for initiating the disease and the antigenic target of the immune attack are still to be identified.

1384 DECREASED INTERFERON RESPONSE BY LYMPHOCYTES FROM CHILDREN WITH CHRONIC HEPATITIS. (Eng.) Tolentino, P.; Dianzani, F.; Zucca, M.; Glacchino, R. (Inst. Infectious Diseases, Univ. Genoa, via 5 Maggio 39, Italy). *J. Infect. Dis.* 132(4):459-461; 1975.

The role of interferon in the pathogenesis of chronic hepatitis was investigated by measuring lymphocyte production of interferon in 16 children with chronic type B hepatitis and in 12 healthy donors. Interferon was induced by the Newcastle disease virus and the parainfluenza virus type 1 (Sendai strain). The yield of interferon was titrated by the Sindbis virus yield-reduction method in monolayers of diploid human embryonic fibroblasts. The amount of interferon produced by the lymphocytes in response to these paramyxoviruses was lower in patients than in healthy donors. In all subjects, interferon titers induced by the viruses were similar. The results suggest that decreased production of interferon may be responsible for the chronicity of this disease.

1385 IMMUNOLOGICAL FACTORS IN THE EVOLUTION OF ACTIVE CHRONIC HEPATITIS AND OTHER AUTOIMMUNE LIVER DISEASES. (Eng.) Smith, M. G. M.; Eddleston, A. L. W. F.; Williams, R. (No affiliation given). *Clin. Gastroenterol.* 4(2): 297-313; 1975.

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1386 TRANSFER FACTOR THERAPY ON CHRONIC ACTIVE HEPATITIS: PRELIMINARY RESULTS IN A PROSPECTIVE DOUBLE-BLIND TRIAL [Abstract]. (Eng.) Shulman, S. T.; Hutto, J. H.; Avoub, E. M.; McGuigan, J. E.; (Dept. Pediatrics and Medicine, Univ. Florida, Gainesville, FL). *Clin. Res.* 23(3):257A; 1975.

1387 HBAg POSITIVE AND HBAg NEGATIVE ACTIVE CHRONIC HEPATITIS. (Ita.) Farini, R.; Chiaramonte, M.; Sturniolo, G.; Naccarato, R. (Universita di Padova, Istituto Patologia Speciale Medica e Metodologia Clinica, Padova, Italy). *Gazz. Sanit.* 46(1/2):33-39; 1975.

1388 HEPATITIS-B-VIRUS INFECTION AND ACTIVE CHRONIC HEPATITIS. (Eng.) de la Concha, E. G.; Ortiz Masllorens, F.; Hernandez-Guio, C. (Fundacion Jimenez Diaz, Madrid 3, Spain). *Lancet* 1(7922):1429; 1975.

1389 ANTILIVER ANTIBODIES IN CHRONIC LIVER DISEASE. (Pol.) Daniluk, J.; Pokora, J.; Tuszkiewicz, M. (Acad. Medicine, 20-950 Lublin, ul. Jacziewskogo 8, Poland). *Pol. Tyg. Lek.* 30(18): 749-751; 1975.

1390 MEASELS, RUBELLA AND LYMPHOCYTE ANTIBODIES IN CHRONIC ACTIVE HEPATITIS [Abstract]. (Eng.) Thomas, H. C.; Sanchez-Tapais, J.; Ross, M.; Jones, J. V. (Royal Free Hosp., Pond St., Hampstead, London NW3 2OG, England). *Clin. Sci. Mol. Med.* 49(3):27p; 1975.

See also, 1358, 1365, 1368, 1373, 1375, 1376, 1407, 1412.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

1391 STANDARD AND AUGMENTED SECRETIN TESTING IN CHRONIC PANCREATIC ALCOHOLIC DISEASE. (Eng.) Bordalo, O.; Noronha, M.; Lamy, J.; Dreiling, D. A. (Faculty Medicine, Hosp. de Santa Maria, Lisbon, Portugal). *Am. J. Gastroenterol.* 64(2): 125-132; 1975.

Sequential standard (1 U/kg) and augmented (4-5 U/kg) secretin response to the pancreas were compared in normal subjects (30), in alcoholic patients with (26) and without cirrhosis (18), and in subjects with alcoholic pancreatitis (40). The parameters studied were volume, bicarbonate concentration, and rate of secretion of bicarbonate. Normal subjects showed significant elevation of all three parameters after augmented stimulation compared to initial response to standard stimulation. In patients with chronic pancreatitis, a fixation or decrease in the maximum bicarbonate concentration was observed, and in pancreatic carcinoma a fixation or a negligible increase of flow and bicarbonate secretion was seen. The standard stimulus was submaximal for the normal subject only. Among 50 chronic alcoholic patients without cirrhosis undergoing rehabilitation subjected to the same sequential testing, the majority of cases (58%) revealed normal pancreatic function. Among the abnormal responses, 7% showed qualitative insufficiency and 35% had high volumes. In a comparable series of alcoholics with cirrhosis, hypersecretion was seen in 83%. The authors propose that alcohol induces fatty degeneration of the pancreatic cell initially, followed by necrosis and fibrosis.

1392 ALCOHOL AND ABSORPTION FROM THE SMALL INTESTINE. 1. IMPAIRMENT OF ABSORPTION FROM THE SMALL INTESTINE IN ALCOHOLICS. (Eng.) Krasner, N.; Cochran, K. M.; Russell, R. I.; Carmichael, H. A.; Thompson, G. G. (Stobhill General Hosp., Glasgow, Scotland). *Gut* 17(4):245-248; 1976.

Standard screening tests as well as jejunal absorptio tests were performed in 10 chronic alcoholic patients within a few days of admission due to an acute alcoholic episode. Impaired absorption of d-Xylose was noted in three patients and low leukocyte ascorbic acid and serum folate levels were found in five patients. No abnormality was detected in jejunal histology. The absorption of water and electrolytes from the jejunum was studied in these patients, using a triple-lumen tube perfusion system containing 56 mM glucose with phenol red and ^{51}chromatin EDTA as marke (20 ml/min). The mean rate of absorption of water in the alcoholic subjects (50·0 ± 2·3 ml/hr) was significantly lower than the mean value in 14 healthy control subjects (205 ± 15·9 ml/hr). A significant reduction in Na$^+$ and Cl$^-$ absorption was also demonstrated in the alcoholic subjects. These results indicate that patients with acute-on-chronic alcoholism may have a functional impairment of water and electrolyte absorption from the jejunum. This may, in part, account for some of the nutritional deficiencies in such patients and for other symptoms such as diarrhea.

1393 SERUM BILE ACIDS IN ALCOHOLIC LIVER DISEASE. COMPARISON WITH HISTOLOGICAL FEATURE OF THE DISEASE. (Eng.) Milstein, H. J.; Bloomer, J. R.; Klatskin, G. (Grady Memorial Hosp., Emory Univ Sch. Medicine, Atlanta, GA). *Am. J. Dig. Dis.* 21(4): 281-285; 1976.

Fasting serum bile acids were measured by gas-liquid chromatography in 64 patients with alcoholic liver disease and were compared with histological features in their percutaneous liver biopsy specimens. Total bile acid concentrations were normal or minimally increased in six patients in whom fatty infiltration was the only hepatic lesion. In the remaining 58 patients with more severe histological lesions, levels were increased in 93%, whereas serum bilirubins were elevated in only 43%. Chenodeoxycholic acid was usually the predominant serum bile acid, regardless of the degree of necrosis or connective tissue change in the biopsy specimen. Only small amounts of the secondary bile acids, deoxycholic acid, and lithocholic acid, were detected. Levels of these secondary bile acids did not correlate with histological features. This study confirms previous reports that fasting total serum bile acid concentrations are nearly always increased in patients with alcoholic liver disease, with chenodeoxycholic acid usually being the predominant bile acid.

1394 EFFECT OF ALCOHOL ON TOTAL URINARY HYDROXYPROLINE EXCRETION. (Eng.) Wu, A.; Levi, A. J. (Northwick Park Hosp., Watford Rd., Harrow, Middlesex HA1 3UJ, Great Britain). *Am. J. Gastroenterol.* 64(3):217-220; 1975.

The relationship between urinary hydroxyproline and histologic evidence of hepatic fibrosis was investigated, as well as the effect of alcohol on this excretion. Urinary hydroxyproline excretion was measured in 33 patients with abnormal liver function test who were regularly drinking over 80 gm. alcohol daily. Those with changes of cirrhosis on liver biopsy excreted significantly more hydroxyproline than those with normal appearances, fatty change or hepatofibrosis. In 16 patients, the excretion was measured both when they were drinking and when abstaining from alcohol, in the form of several beverages. The rate of excretion was significantly higher 2-7 days immediately following abrupt withdrawal of alcohol. This result raises the possibility that alcoholic beverages may inhibit collagen degradation. If substantiated, it further suggests that the effect of alcohol on collagen metabolism may be of importance in the pathogenesis of alcoholic cirrhosis.

1395 ALCOHOL HEPATITIS. (Eng.) Martin, W. J., II.; Garber, J. J. (Mayo Graduate Sch. Medicine, Rochester, MN). *Minn. Med.* 58(11):816-819; 1975.

1396 TRENDS IN ALCOHOL CONSUMPTION AND ASSOCIATED ILLNESSES: SOME EFFECTS OF ECONOMIC CHANGES. (Eng.) Brenner, M. H. (Johns Hopkins Univ. Sch. Hygiene Public Health, Baltimore, MD 21205). *Am. J. Public Health* 65(12): 1279-1292; 1975.

1397 SKELETAL AND LEAN BODY MASS IN ALCOHOLICS WITH AND WITHOUT CIRRHOSIS. (Eng.) Roginsky, M. S.; Zanzi, I.; Cohn, S. (Brookhaven Natl. Lab., Upton, NY). p 314, 1975. [available through National Technical Information Services, Washington, DC. Document No. BNL-20238].

1398 BEHAVIORAL AND BIOCHEMICAL INTERRELATIONS IN ALCOHOLISM. (Eng.) Mendelson, J. H.; Mello, N. K. (Harvard Medical Sch., Belmont, MA 02178). *Annu. Rev. Med.* 27:321-333; 1976.

1399 HISTOLOGICAL DIAGNOSIS OF ALCOHOLIC HEPATITIS: CLINICAL AND PROGNOSTIC SIGNIFICANCE OF MALLORY BODIES. (Spa.) Bruguera, M.; Rodes, J.; Bordas, J. M. (Hospital Clinico y Provincial, Barcelona, Spain). *Rev. Clin. Esp.* 136(2):131-138; 1975.

1400 DIFFERENCES IN THE PROBABILITY OF DEVELOPING CIRRHOSIS IN ALCOHOLIC MEN. (Fre.) Thomas, M. (Hopital Saint-Antoine, 184, rue Fg Saint-Antoine, 75571 Paris Cedex 12, France). *Entretiens Bichat Med.* 347-352; 1974.

See also, 1295, 1330, 1365, 1490, 1491, 1492.

LIVER AND BILIARY TRACT

Cirrhosis

1401 COMBINED PORTAL AND VENA CAVAL HYPERTENSION IN GAUCHER DISEASE: THE VALUE OF PREOPERATIVE VENOGRAPHY. (Eng.) Fellows, K. E.; Grand, R. J.; Colodny, A. H.; Orsini, E. N.; Crocker, A. C. (Children's Hosp. Medical Center, 300 Longwood Ave., Boston, MA 02115). *J. Pediatr.* 87(5):739-743; 1975.

A 7-yr-old boy with prior splenectomy in association with Gaucher disease developed portal hypertension, ascites, and obstruction of the inferior vena cava in its hepatic segment, resulting in terminal hepatic failure. Prior to a portacaval anastomosis operation, a localized obstruction of the inferior vena cava at the sub-diaphragmatic level was demon-

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strated by caval manometry and inferior vena cavography. The operation lowered portal venous pressure from 47 to 23 cm saline, but in the first few postoperative weeks there was continued hematemesis indicative of inadequate portal decompression, and the patient died. At autopsy, centrilobular hepatic fibrosis appeared to be responsible for the portal hypertension. Nodular enlargement of the right and caudate lobes of the liver was the cause of the caval obstruction, and elevated caval resistance may have contributed to the portal hypertension and failure of the portacaval anastomosis. The value of preoperative inferior vena cavography in addition to arterial portography in children with portal hypertension is stressed.

1402 FIBREOPTIC ENDOSCOPY AND THE USE OF THE SENGSTAKEN TUBE IN ACUTE GASTROINTESTINAL HAEMORRHAGE IN PATIENTS WITH PORTAL HYPERTENSION AND VARICES. (Eng.) Novis, B. H.; Duys, P.; Barbezat, G. O.; Clain, J.; Bank, S.; Terblanche, J. (Groote Schuur Hosp., Observatory 7925, Cape Town, South Africa). *Gut* 17(4):258-163; 1976.

The value of emergency upper gastrointestinal fiberendoscopy, followed by the use of a modified Sengstaken tube when required, was studied during 84 episodes of acute bleeding in 75 patients who had evidence of portal hypertension with varices. The portal hypertension was due to alcoholic cirrhosis in 59 patients and to cryptogenic cirrhosis in 7 of the patients. By definition, varices were present in all patients, but in only 56 episodes were the varices the cause of the bleeding. The correct diagnosis of the source of bleeding was made at endoscopy in 89%. A Boyce modification of the Sengstaken-Blakemore tube was passed in 41 of the 56 episodes of variceal bleeding. It effectively stopped the bleeding primarily in 35 patients but was successful as a final definitive measure in only 19 patients. Only 16 of the patients in whom the tube was passed, survived. The results indicate that the mortality rate may be related to the severity of the bleeding and to hepatocellular dysfunction. Survival increased from 23% in those patients with jaundice, ascites, and encephalopathy on admission to 92% in those without these manifestations. The in-hospital survival rate was 52% in patients bleeding from varices and 64% in those bleeding from other causes, with an overall survival rate of 56%. The results indicate poor prognosis in cirrhotic patients with gastrointestinal bleeding, irrespective of the cause.

1403 A PROSPECTIVE CONTROLLED TRIAL OF AZATHIOPRINE IN PRIMARY BILIARY CIRRHOSIS. (Eng.) Heathcote, J.; Ross, A.; Sherlock, S. (Royal Free Hosp., Pond St., London NW3 2QG, England). *Gastroenterology* 70(5):656-660; 1976.

A prospective controlled trial was conducted with 45 patients (42 women and 3 men) to determine the value of azathioprine (2 mg/kg) in the treatment of primary biliary cirrhosis. Of the 22 patients started on azathioprine, 3 were withdrawn due to severe diarrhea in 2 and temporary bone marrow aplasia in one. The age and duration of symptoms was not markedly different between the treatment and control groups. Pretrial hematological and biochemical tests showed significantly lower hemoglobin values in controls. When pruritus was assessed at periods between 6 months and 5 yr of starting the trial, there was a consistently smaller number of patients with this problem in the treated than in the control group. Laboratory tests showed significant reductions in the WBC count in the treated group at each period of assessment, except at the 4-yr mark. The effect of azathioprine was not reflected in the platelet counts. During the firs year, serum aspartate transaminase levels showed a significant change in favor of the treated group, but this improvement did not continue. Throughout the trial, serum alkaline phosphatase, bilirubin, cholesterol, albumin, and immunoglobulin M values showed no significant change. Titers of serum mitochondrial antibodies became negative more often in treated than in untreated patients. Serial hepatic biopsy specimens demonstrated the development of cirrhosis equally in the two groups. Survival was similar for the first 5 yr of the trial. However, there was a significant difference in favor of the treated group in the 6th yr, although the number of patients available for assessment at that time was so small as to render a definite conclusion impossible.

1404 USE OF BUMETANIDE IN THE TREATMENT OF ASCITES DUE TO LIVER DISEASE. (Eng.) Moult, P. J. A.; Trash, D. B.; Lunzer, M. R.; Sherlock, S. (Royal Free Hosp., Pond St., London NW3 2QG, England). *Postgrad. Med. J.* 51(Suppl 6): 81-84; 1975.

Bumetanide was evaluated in the treatment of 17 patients with chronic liver disease and ascites, with particular emphasis on incidence of complications such as electrolyte disturbances and hepatic encephalopathy. Bumetanide was given at a dose of 1 mg daily. Thirteen of the 17 patients responded; 2 patients responded to a larger dose (2 mg). Three patients were hypokalemic before treatment; 8 of the remaining 14 developed hypokalemia a few days after starting therapy. Hepatic encephalopathy was present initially in six patients; it appeared in two during the course of therapy. Sodium levels were significantly lower during therapy. Two patients died during the initial bumetanide treatment and four others died following the treatment, as a result of their liver diseases. Of 10 patients who were followed up after discharge, 2 required an increased dose to prevent recurrence of ascites and 2 had relapses and died, despite treatment. During treatment, two patients responded to the drug with diuresis, but over the first 9 days, sodium excretion was less than dietary intake. In all, 15 of 17 patients responded satisfactorily to bumetanide, but a potassium sparing diuretic was necessary in 6.

1405 THE CLINICAL SIGNIFICANCE OF CLASSIFICATIONS OF CIRRHOSIS. A COMPARISON BETWEEN CONVENTIONAL CRITERIA AND NUMERICAL TAXONOMY. (Eng.) Winkel, P.; Juhl, E.; Tygstrup, N.; Copenhagen Study Group for Liver Diseases. (Kommunehospitalet, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(1): 33-40; 1976.

A group of 441 patients from a randomized clinical trial of prednisone treatment was classified according to different criteria, and the effect of this therapy was assessed by comparing the survival curves of controls and treated patients in the groups. Six classifications based on single criteria were studied: females versus males, alcoholics versus nonalcoholics, compensated versus decompensated cases, active versus inactive cases, manifest versus latent cases, and nonprimary biliary versus primary biliary cirrhosis. The latter group was too small for further analysis. The material was classified by numerical taxonomy, based on 56 clinical symptoms, signs, and histological and serological changes. The taxonomical classification showed interdependence with all the clinical classifications, except that of primary biliary cirrhosis. Three clinical classifications, those based on sex, alcoholism, and compensation, and one taxonomic class showed a significant therapeutic relevance. Combination of these criteria revealed that female patients with compensated nonalcoholic cirrhosis, previously demonstrated to benefit from prednisone treatment, showed a markedly greater prednisone effect if they belonged to the taxonomic group than if they did not. According to clinical, histologic, and laboratory data, the latter group was characterized as less severe cases than the former one. Although the discrepancy between clinical severity and therapeutic effect cannot be fully explained, the data suggest that clinical criteria may not be ideal for selection of cirrhotic patients for steroid therapy, and that numerical taxonomy may provide clues for more clinically significant classifications.

1406 ANDROGEN METABOLISM AND LEYDIG-CELL FUNCTION IN ACUTE AND CHRONIC LIVER DISEASE. (Ger.) Littman, K. P.; Gerdes, H.; Martini, G. A. (Medizinische Klinik der Universitat Marburg/Lahn, Marburg, Germany). *Dtsch. Med. Wochenschr.* 100(38): 1881-1887; 1975.

Diurnal variations of plasma testosterone and urinary excretion rates of testosterone-, androsterone-, aetiocholanolone-, and dehydroepiandrosterone-glucuronide, as well as dehydroepiandrosterone-sulphate were measured in eight patients with alcoholic liver cirrhosis, 10 patients with acute hepatitis, and in four patients with hemochromatosis before and after selective Leydig cell stimulation with 3 x 5000 IU human gonadotrophin. The circadian variation of plasma testosterone and the maximal testosterone concentration after human gonadotrophin stimulation were decreased in patients with cirrhosis and hemochromatosis. In those with acute hepatitis, the diurnal variations were evened out; whereas, individual values were within the normal range. Urinary excretion of free testosterone and testosterone glucuronide was significantly reduced in patients with cirrhosis and hemochromatosis before and after stimulation. The urinary pattern of C_{19} steroid metabolites was markedly changed in favor of the 5-α-steriods in acute hepatitis, cirrhosis, and hemochromatosis.

1407 STUDIES ON CITRATE METABOLISM IN LIVER INJURIES. 1. FASTING BLOOD CITRATE LEVEL IN CHRONIC HEPATITIS AND LIVER CIRRHOSIS. (Eng.) Kaneshige, J. (Okayama Univ. Medical Sch., Okayama, Japan). *Acta Med. Okayama* 29(1):1-8; 1975.

Blood citrate, blood glucose, and serum nonesterified fatty acids (NEFA) in fasting state were measured in 17 patients with chronic hepatitis and liver cirrhosis. Citrate and glucose were measured by enzymatic methods, and NEFA was measured colorimetrically. Fasting blood citrate level rose with the severity of liver diseases, especially in decompensated liver cirrhosis. No significant difference in fasting blood citrate level was found between the subjects with and without glucose intolerance. Fasting blood citrate level had a closer correlation with serum NEFA level than with blood glucose level. It is concluded that the increase in blood citrate level in liver diseases is due to the impaired uptake of citrate by the liver and the increased release of citrate from peripheral tissues.

1408 POTASSIUM STATUS OF PATIENTS WITH CIRRHOSIS. (Eng.) Soler, N. G.; Jain, S.; James, H.; Paton, A. (Dudley Road Hosp., Birmingham, England). *Gut* 17(2):152-157; 1976.

The potassium status of 55 cirrhotic patients was studied in relation to different etiological types of the disease and the influence of factors such as decompensation, carbohydrate intolerance, and diuretic treatment. In addition, the acute and long-term changes in whole-body potassium in relation to the clinical condition and its management were investigated. Of the 55 cases, 34 had alcoholic cirrhosis, 10 had cryptogenic cirrhosis, 8 had chronic active hepatitis, and 3 had hemochromatosis. Whole-body potassium was measured by detecting naturally occurring ^{40}K in a whole body counter. Cirrhotic patients were not always depleted of whole-body potassium, while the majority of alcoholics were depleted. Patients with chronic active hepatitis had normal body potassium stores. Patients with cryptogenic cirrhosis were also depleted but their potassium deficit was not as severe. In general, decompensated patients had low body potassium stores, but only patients with ascites were invariably depleted. One-third of the patients receiving diuretics maintained normal whole body potassium. Diabetes requiring treatment with p.o. hypoglycemic drugs or insulin was not a significant factor in potassium depletion. Eight of 22 fully compensated patients not receiving diuretics were also significantly depleted of potassium, suggesting that in the natural course of cirrhosis, other factors are also important in potassium depletion. The lack of response to potassium supplements, and indications that all patients with an initially normal whole-body potassium maintained this status despite the use of diuretics or corticosteroids over short terms, suggest that treatment is singularly ineffective in changing the potassium status of cirrhotics over the course of a few months. The clinical and prognostic significance of a low whole-

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body potassium in patients with cirrhosis remains a matter for debate.

1409 HYPERTYRAMINEMIA IN CIRRHOTIC PATIENTS.

(Eng.) Faraj, B. A.; Bowen, P. A.; Isaacs, J. W.; Rudman, D. (467 Woodruff Memorial Building, Emory Univ. Sch. Medicine, Atlanta, GA 30322). *N. Engl. J. Med.* 294(25):1360-1364; 1976.

Plasma concentration of tyramine was studied by radioimmunoassay in 8 healthy subjects, 20 hospitalized patients without liver disease, and 13 cirrhotic patients (of whom 7 had hepatic encephalopathy) to evaluate its role in hepatic disorders. The effect of increasing dietary protein on the tyramine level of cirrhotic patients was also assessed. No significant difference in plasma tyramine concentration was seen between normal subjects (1.3 ± 0.1 ng/ml), hospitalized patients without hepatic disease (1.4 ± 0.1 ng/ml) and cirrhotic patients with encephalopathy (2.7 ± 0.5 ng/ml). However, the tyramine level in cirrhotic patients with encephalopathy (6.4 ± 0.1 ng/ml) was significantly higher than in normal subjects or in cirrhotic patients without encephalopathy. Increasing dietary protein from 40 to 80 g/day raised fasting tyramine concentration by 30-70% within 3 days in both encephalopathic and nonencephalopathic cirrhotic patients. Concentration of plasma tyramine in cirrhotic subjects was significantly correlated with that of plasma tyrosine ($p<0.001$).

1410 RELATIONSHIPS BETWEEN TRYPTOPHAN IN SERUM AND CSF, AND 5-HYDROXYINDOLEACETIC ACID IN CSF OF MAN: EFFECT OF CIRRHOSIS OF LIVER AND PROBENECID ADMINISTRATION.

(Eng.) Young, S. N.; Lal, S.; Sourkes, T. L.; Feldmuller, F.; Aronoff, A.; Martin, J. B. (Lab. Neurochemistry, Allan Memorial Inst. Psychiatry, 1025 Pine Ave. West, Montreal, Quebec, Canada H3A 1A1). *J. Neurol. Neurosurg. Psychiatry* 38(4):322-330; 1975.

Tryptophan was measured in the lumbar cerebrospinal fluid (CSF) and serum of patients undergoing neurologic investigation (controls) and in patients with hepatic cirrhosis. Samples were taken from the patients after an overnight fast. Under these conditions, in the controls the mean CSF, free (non-albumin-bound) and total serum tryptophan were in the approximate ratio 1:4:24. In this cross-sectional study, for the controls, CSF tryptophan was correlated significantly and positively with the total serum but not with the free serum tryptophan. In patients with advanced hepatic cirrhosis the mean CSF tryptophan concentration was greatly elevated. However, the mean total serum tryptophan was unchanged and the free serum tryptophan only slightly elevated. Administration of probenecid, which displaces tryptophan from binding sites on serum albumin, increasing the proportion of serum tryptophan in the free form, did not affect CSF tryptophan.

1411 CHOLANGIODYSPLASTIC PSEUDOCIRRHOSIS: LIGHT AND ELECTRON MICROSCOPIC EXAMINATION.

(Eng.) Balazs, M.; Lukacs, V. F.; Denes, L.; Goracz, G. (Janos Hosp. of Budapest Council, 1125, Budapest Diosarok ut 1, Hungary). *Virchows Arch.* [*Pathol. Anat.*] 368(1):61-71; 1975.

The case of a 5-month-old girl with cholangiodysplastic pseudocirrhosis is presented. The infant's brother had died at the age of 5 months with the same condition Electron microscopic examination of a liver biopsy specimen revealed active proliferation of ductular cells and progression of fibrogenesis, findings consistent with the rapid and fatal course of the disease. An acute cholangitis occurred, but after healing, the progression of the original process led to hepatic insufficiency. It is suggested that cholangiodysplastic pseudocirrhosis is a chronic, progressive liver disease; the course of the disease might be hastened by the complication of cholangitis.

1412 NUTRITION IN CRYPTOGENIC CIRRHOSIS AND CHRONIC AGGRESSIVE HEPATITIS. (Eng.)

Morgan, A. G.; Kelleher, J.; Walker, B. E.; Losowsky, M. S. (Airedale General Hosp., Eastburn, Nr. Keighley, England). *Gut* 17(2):113-118; 1976.

A nutritional survey was made of 80 patients with nonalcoholic cirrhosis; 60 had cryptogenic cirrhosis and 20 had chronic aggressive hepatitis. The nutritional status was assessed by determining various nutritional parameters in body fluids. Steatorrhea, present in 44% of the patients, was never severe and was not a major factor in causing nutritional deficiencies. Plasma levels of fat soluble vitamins were low in over a third of the subjects; these low levels were not related to age or steatorrhea. There was no evidence of thiamin deficiency, in contrast with earlier reports on patients with alcoholic liver disease and on chronic alcoholic subjects. A small proportion of the patients had very high urinary N-methylnicotinamide levels as had been reported in earlier studies on alcoholic cirrhosis. Leukocyte ascorbic acid estimations were low in 35% of the patients; this was not age related. It is noted that iron deficiency may mask ascorbic acid deficiency and that leukocyte vitamin C was subnormal in 40% of the patients with a normal serum iron, but only in 10% of those with low serum iron. Low RBC folate occurred in 24% and low serum folate in 17% of the patients, but not always together, and in no case was there megaloblastic change or anemia. Serum B_{12} was low in only three patients and these had a megaloblastic marrow. It is suggested that serum iron and percentage saturation of transferin can be used to indicate iron status in patients with liver disease. The incidence of fat soluble vitamin deficiency (40%) was higher than that of water soluble vitamins, which may reflect malabsorption of fat soluble vitamins due to bile salt deficiency in liver disease. The incidence of nutritional deficiency was less frequent in nonalcoholic as compared with alcoholic liver disease.

1413 HEPATIC LESIONS IN PANCREATITIS. CLINICO-EXPERIMENTAL DATA.

(Eng.) Tuzhilin, S. A.; Podolsky, A. E.; Dreiling, D. A. (Mt. Sinai Sch. Medicine, City Univ. New York, 100th St. and 5th Ave., New York, NY 10029). *Am. J. Gastroenterol.* 64(2):108-114; 1975.

The relation of hepatic and pancreatic lesions was studied in 108 patients with cirrhosis, including 29 autopsy cases of liver cirrhosis, and in 14 dogs with induced pancreatitis. Steatorrhea and creatorrhea of significant magnitude were demonstrated in patients with active cirrhosis by absorption tests with ^{131}I-glyceryl trioleate and ^{131}I-oleic acid. The autopsy findings indicated a parallelism of pathologic changes in the liver and pancreas. In postnecrotic cirrhosis, areas of necrosis were prevalent in the pancreas, while in portal cirrhosis, necrobiosis was absent from the pancreas but sclerosis was prominent. Experimental pancreatitis was induced in 14 adult dogs by injecting 5 ml of duodenal contents into the ligated main pancreatic duct (the minor duct was also ligated). Pancreatitis was produced in 4 dogs by injecting 5 ml of an incubated mixture of blood and trypsin into the ligated ducts. In most of the animals, the liver showed hemorrhage and necrosis, fatty degeneration, disorganization of the lobular structure, congestion, and lymphoid infiltration. Surviving dogs that developed chronic pancreatitis with fibrosis and atrophy had more severe and extensive hepatic lesions. Hepatitis and frank cirrhosis were observed only in the pancreatic fibrosis animals. The hepatic reaction was greater in dogs induced with blood-trypsin mixtures or duodenal contents injected into the main pancreatic duct than in dogs induced with 10% formalin injected into one of the pancreatic arteries. There seemed to be a correlation between the frequency, extent and severity of hepatic lesions and the duration of pathology. The findings do not exclude the possibility that, in man, the etiologic factor producing pancreatitis may be the agent producing hepatic damage.

1414 HEMODYNAMIC EVALUATION OF PATIENTS WITH INTRAHEPATIC PORTAL HYPERTENSION: RELATIONSHIP BETWEEN BLEEDING VARICES AND THE PORTOHEPATIC GRADIENT. (Eng.) Viallet, A.; Marleau, D.; Huet, M.; Martin, F.; Farley, A.; Villeneuve, J.-P.; Lavoie, P. (Hopital Saint-Luc, 1058 St. Denis, Montreal, P.Q., Canada). *Gastroenterology* 69(6):1297-1300; 1975.

A hemodynamic evaluation of 19 patients with intrahepatic portal hypertension and who had bled from varices is presented. Combined hepatic and umbilicoportal catheterization was performed in 17 cases and hepatic vein catheterization in 2. Free portal venous pressure (FPVP), wedged hepatic venous pressure (WHVP), and free hepatic venous pressure (FHVP) were measured. The portohepatic gradient (FPVP-FHVP or WHVP-FHVP) was utilized as an index of portal hypertension. In the 19 patients, the portohepatic gradient ranged from 12 to 24.5 mm Hg (mean of 18.4 mm Hg). The highest values obtained were 24 and 24.5 mm Hg recorded in the two cases of primary biliary cirrhosis. In two patients with postnecrotic cirrhosis, values were 14.5 and 16.5 mm Hg. Two cases of idiopathic portal hypertension had values of 17 and 14.5 mm Hg. In 13 alcoholic cirrhotics, the portohepatic gradient varied between 12 and 21.5 mm Hg (mean of 18.3 mm Hg). These data suggest that in intrahepatic portal hypertension, bleeding varices are observed only if significant portal hypertension exists. Hemodynamic studies may be helpful in evaluating bleeding patients with varices particularly when the origin of the bleeding cannot be determined at endoscopy. The finding of a portohepatic gradient of less than 12 mm Hg strongly suggests that varices are not the source of bleeding.

1415 VALUE OF SURGERY IN PORTAL HYPERTENSION AT THE SURGICAL WARD OF TREICHVILLE HOSPITAL, IVORY COAST. (Fre.) Benoit, G. (Hopitaux de Paris, France). *Med. Trop. (Marseille)* 34(6):750-757; 1974.

1416 PERIHEPATITIS CHRONICA HYPERPLASTICA AND PORTAL HYPERTENSION IN CAMBODIA. (Fre.) Tournier-Lasserve, Ch.; Yean, Y. K.; Le Peltier, P.; Brouillard, A.; Daneth, K.; Van, M. K. (Service de Sante des Armees, France). *Med. Trop. (Marseille)* 34(6):789-798; 1974.

1417 AGENESIA OF THE RIGHT LOBE OF THE LIVER AND PORTAL HYPERTENSION. (Fre.) Tournier-Lasserve, Ch.; Tol, Y.; Brouillard, A.; Rons, R. (Service de Sante des Armees, France). *Med. Trop. (Marseille)* 34(6):799-805; 1974.

1418 PORTAL HYPERTENSION AND PRIMARY LIVER CANCER. (Fre.) Tonnel, J. (C.H.U., Lille, France). *Med. Trop. (Marseille)* 34(6):775-780; 1974.

1419 URGENT PROBLEMS CREATED BY HEMORRHAGES IN TROPICAL PORTAL HYPERTENSION. (Fre.) Carayon, A. (Institut de Medecine Tropicale, Parc du Pharo, 13998 Marseille-Armees, France). *Med. Trop. (Marseille)* 34(6):781-786; 1974.

1420 AN ETIOLOGICAL AND HISTOPATHOLOGICAL STUDY OF HEPATIC CIRRHOSIS CASES: WITH SPECIAL EMPHASIS ON THOSE ASSOCIATED WITH AMEBIASIS. (Eng.) Kasliwal, R. M. (S.M.S. Medical Coll., Jaipur, India). *Am. J. Proctol.* 26(3):45-55; 1975.

1421 URINE EXCRETION OF VIT. B_{12} ^{58}Co IN PATIENTS WITH HEPATIC CIRRHOSIS PREVIOUSLY TREATED WITH THERAPEUTIC DOSES OF NON-RADIOACTIVE VIT. B_{12}. (Eng.) Mincev, M. (Medical Faculty, I. P. Pavlov, Plovdiv, Bulgaria). *Folia Med. (Plovdiv)* 16(4):221-224; 1974.

1422 URINARY ZINC IN HEPATIC CIRRHOSIS. (Eng.) Allan, J. G.; Fell, G. S.; Russell, R. I. (Royal Infirmary Glasgow, Scotland). *Scott. Med. J.* 20(3):109-111, 1975.

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1423 GASEOUS AND ACID-BASE CHANGES IN PATIENTS WITH CIRRHOSIS HEPATITIS [SIC] IN 100% OXYGEN RESPIRATION. (Eng.) Mincev, M.; Valkov, I. (I. P. Pavlov, Plovdiv, Bulgaria). *Folia Med. (Plovdiv)* 16(2):115-120; 1974.

1424 YELLOW FINGERS DOTTED WITH RED: EASY DIAGNOSIS OF PRIMARY BILIARY CIRRHOSIS ASSOCIATED WITH TELANGIECTATIC SCLERODERMA OR REYNOLD'S SYNDROME. TWO CASE REPORTS. (Fre.) Besancon, F.; Touraine, R.; Bilski-Pasquier, G. (Hopital Broussais, 97, rue Didot, 75014 Paris, France). *Entretiens Bichat Med.* 319-324; 1974.

1425 HEMORRHAGES FROM ASSOCIATED LESIONS IN PATIENTS WITH LIVER CIRRHOSIS. (Ita.) Manenti, V.; Carrera, G. (Ospedale di Circolo di Merate, Italy). *Osp. Ital. Chir.* 27(1):1-7; 1974.

See also, 1299, 1322, 1330, 1361, 1365, 1389, 1391, 1394, 1396, 1400.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

1426 DIAGNOSIS AND TREATMENT BY GI ENDOSCOPY. ENDOSCOPIC RETROGRADE CHOLANGIO-PANCREATOGRAPHY AND SPHINCTEROTOMY OF THE PAPILLA OF VATER. (Eng.) Classen, M. (1 Med. Abteilung, 2000 Hamburg 60, Rubenkamp 148, Hamburg, W. Germany). *J. Norwegian Med. Assoc.* 95(5):293-295; 1975.

The use of endoscopic retrograde cholangio-pancreatography and sphincterotomy of the papilla of Vater in diagnosis is reviewed. Normal criteria for its use include: an emptying time of less than 10 min; a pancreatic duct with maximum dimensions of 4.4 mm for the head, 3.3 mm for the body region, and 2.2 mm for the tail; and a common bile duct with a diameter of 6 mm at the ampulla of Vater, 6.4 mm at the cystic duct, and 4.9 mm below the bifurcation of the hepatic duct. In 100 patients tested, five characteristic changes occurred, usually in combination. These were papillary stenosis, stop of the contrast medium filling within the pancreatic duct, caliber variations and strictures, calcification, and pseudocysts. In 65 of 100, the biliary system was filled retrograde, and pathological changes were seen in all but 10 cases. In all, 77% of the patients presented with pathological changes in the biliary system. There were no changes in the pancreatic duct in 15 of 37 patients and in 27 control subjects given endoscopic retrograde ductography. None of the patients with pathological changes of the pancreatic duct had an intact endocrine system. Pancreatic cancer can be diagnosed by cholangio-pancreatography but this does not solve the problem of early recognition. In 600 patients examined by the technique, side effects included: pain and fever in 6%, a slight increase in amylase in 30%, and a massive amylase increase in 6%. In 85 of 114 patients with jaundice, representation of the efferent bile ducts was successful using endoscopic-radiological means. Endoscopic sphincterotomy of the papilla of Vater was successfully performed with a new device in 10 dogs and in 10 patients with jaundice.

1427 DEVELOPMENT AND EVALUATION OF USE OF CHOLECYSTOKININ IN THE DIAGNOSIS OF ACALCULOUS GALLBLADDER DISEASE. (Eng.) Cohen, W. H.; Freeman, J. B. (Univ. Iowa Coll. Medicine, Iowa City, IA 52242). *Can. J. Surg.* 18(6):571-578; 1975.

Studies on the development and evaluation of use of cholecystokinin (CCK) in the diagnosis of acalculous gallbladder disease are reviewed. Cholecystectomy is of no benefit in approximately 1/3 of those patients with epigastric and right upper quadrant pain. The use of CCK has been proposed to augment cholecystography or biliary drainage procedures, or both, to identify those patients in whom the gallbladder is the source of pain. Radiographic evaluations often are not subjected to adequate, unbiased interpretation, and some follow-up studies are incomplete and of short duration. The authors conclude that despite these objections there is evidence that CCK can be useful as a diagnostic aid, and therefore, continued, controlled, and well-designed studies are warranted.

1428 DIAGNOSIS AND MANAGEMENT OF BILE DUCT STRICTURES. (Eng.) Hermann, R. E. (Cleveland Clinic Foundation, 9500 Euclid Ave., Cleveland, OH 44106). *Am. J. Surg.* 130(5):519-522; 1975.

The success of five different surgical methods used to repair common bile duct stricture was studied in 100 patients for a 2 to 20-yr postoperative period. The surgical methods included: choledochoduodenostomy in 59 patients, resection of the stricture and duct-to-duct repair in 11, choledochojejunostomy in 9, plastic revision of the stricture in 7 and, dilatation and placement of a T tube splint through a difficult recurrent stricture in 14. Excellent (no further symptoms) or good results (mild intermittent symptoms that subsided with medical treatment) were obtained in 84 patients. Sixteen patients had recurring episodes of cholangitis or jaundice or required another operation on the biliary tract. The best results were obtained in patients in whom choledochoduodenostomy was performed.

1429 SPHINCTEROPLASTY AND CHOLEDOCHODUODENOSTOMY FOR BENIGN BILIARY OBSTRUCTIONS. (Eng.)

Rutledge, R. H. (901 South Lake St., Fort Worth, TX 76104). *Ann. Surg.* 183(5):476-487; 1976.

The patient selection techniques, technical details, advantages, and limitations of sphincteroplasty and choledochoduodenostomy for benign biliary obstructions are presented for 73 patients. Sixty patients underwent transduodenal sphincteroplasty; 52 were primary procedures and 8 were secondary. There was no postoperative mortality. Indications for transduodenal sphincteroplasty as the primary operative procedure included stones in the lower end of the duct requiring duodenotomy in 20 patients, failure of passage of #3 or #4 Bakes dilators in 18, primary stones or sludge in 10, and multiple secondary stones in 4. Many patients had a transient hyperamylasemia but only two had pancreatitis. There were no pancreatic or duodenal fistula. None of the patients has any recurrence of jaundice, pain, cholangitis, or any subsequent operation related to the biliary tree. Two of the eight patients for whom this was a secondary procedure continued to suffer from abdominal pain. Choledochoduodenostomy was the primary procedure in the remaining 13 patients. The main indication for this procedure were large primary stones or sludge in seven patients, multiple stones in three, and failure of a #4 dilator in three. There were no significant operative complications, and no related deaths. While both operations are valuable for benign biliary obstructions, sphincteroplasty is preferred as it provides dependent drainage, direct inspection of the ampullary area, and it facilitates the removal of impacted stones and debris. However, choledochoduodenostomy is chosen for elderly poor risk patients or for those patients with pancreatic inflammation or periampullary duodenal diverticula.

1430 CHOLECYSTECTOMY WITH AND WITHOUT SURGICAL DRAINAGE. (Eng.)

Goldberg, I. M.; Goldberg, J. P.; Liechty, R. D.; Buerk, C.; Eiseman, B.; Norton, L. (Univ. Colorado Medical Center, 4200 East Ninth Ave., Denver, CO 80220). *Am. J. Surg.* 130:29-32; 1975.

The need for surgical drainage after simple, uncomplicated cholecystectomy was evaluated by comparing 37 patients who underwent the operation without drainage with 37 patients who had drainage procedures. Both groups demonstrated absence of gross infection and a dry gallbladder bed at the end of surgery, and neither group underwent exploration of the common duct. The operation with drainage had a median duration of 121 min as opposed to 90 min without drainage. There were no deaths in either group. Postoperative fever occurred in 45% of the patients with drainage and in 26.5% of the patients without drainage. Wound infection occurred in 8.1% of the patients with drainage and in none of the patients without drainage. The patients given drainage had a greater total incidence of postoperative complications (19 of 35 as compared to 9 of 34). Postoperative hospitalization duration was longer for patients given drainage (a median of 5 days as opposed to 3 days). The results suggest that surgical drainage after uncomplicated cholecystectomy is unnecessary and may result in increased incidence of morbidity and prolonged hospital stay.

1431 HEPATIC PORTOENTEROSTOMY: AN ASSESSMENT OF ITS VALUE IN THE TREATMENT OF BILIARY ATRESIA. (Eng.)

Campbell, D. P.; Smith, E. I.; Bhatia, M.; Poley, J. R.; Williams, G. R. (Oklahoma Children's Memorial Hosp., P.O. Box 26901, Oklahoma City, OK 73190). *Ann. Surg.* 181(5):591-595; 1975.

The cases of 12 infants who underwent hepatic portoenterostomy for incorrectable-type biliary atresia are reviewed. There was one postoperative death and there were significant postoperative complications in three cases. These included massive upper gastrointestinal bleeding secondary to gastric stress ulcers, intestinal obstruction secondary to adhesions, and upper gastrointestinal bleeding. The mean total survival time was 15.3 months. By 39 months, three infants were still alive. The terminal course in the other nine included upper gastrointestinal bleeding, liver failure, and sepsis. Two of the survivors were in end-stage liver failure. The third had a liver transplant and was doing well at 14 months post-transplant. Assuming the previously reported 10% cure rate, there is a 28% probability that the series was not large enough to show cures with hepatic portoenterostomy.

1432 CHOLANGITIS WITH ACUTE RENAL FAILURE: PRIORITIES IN THERAPEUTICS. (Eng.)

Bismuth, H.; Kuntziger, H.; Corlette, M. B. (Unite de Chirurgie Hepato-Biliaire, Hopital Paul Brousse, 94800 Villejuif, Paris, France). *Ann. Surg.* 181(6):881-887; 1975.

The relation of cholangitis with acute renal failure and therapeutic priorities were studied in 21 patients. The signs of infection were severe and included septicemia and shock (9), obtundation or coma (15), bile duct obstruction caused by lethiasis (13), tumor of the ampulla of Vater (4), and other tumors of the lower duct (4). Only one patient had a history of previous mild renal disease. Twelve had anuria or oligura and nine presented with high output renal failure. Severity and duration of the renal disorder were variable, but there was no statistical correlation between severity and serum bilirubin. Two patients died in shock soon after admission and one refused surgery. Treatment consisted of fluid replacement, furosemide, and antibiotics. Three patients treated with emergency surgery died. Fifteen patients treated with fluid and antibiotic therapy before surgery showed better survival rates. In two patients with persistent sepsis, emergency hemodialysis and surgery resulted in survival in seven cases. Improvement in terms of infection allowed elective surgery in seven cases

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at 8-36 days. Temporary improvement allowed successful emergency surgery when signs returned in two patients. The priority order of therapeutic methods is treatment of infection, treatment of renal failure, and, finally, surgery. Dialysis should be considered in cases requiring emergency surgery.

1433 GALLSTONES AFTER ILEOSTOMY AND ILEAL RESECTION.

(Eng.) Hill, G. L.; Mair, W. S. J.; Goligher, J. C. (The General Infirmary, Leeds, England). *Gut* 16(12):932-936; 1975.

The incidence of gallstones was determined in 108 patients, following ileostomy and ileal resection with particular emphasis on the amount of ileum removed and the nature of the underlying disease (ulcerative colitis in 72 cases, Crohn's disease in 35, and polyposis coli in 1). Evidence of cholelithiasis was obtained by interrogation regarding symptoms or cholecystography using a standard technique with sodium ipodate as the contrast medium. From the necropsy data in three published studies, the expected frequency of gallstones was 2.1% for patients under 40 yr of age and 13.4% for those over 40. However, there was a greatly increased incidence of cholelithiasis with stones demonstrated in 17.1% of those under 40 and 30.5% in those over 40 yr of age. Stones occurred in 15.2% of the men and 31.7% of the women. The frequency of cholelithiasis did not rise with the passage of time since operation. In cases where the amount of ileum resected was more than 10 cm (range, 12 cm to 2 m), there was little difference in the incidence of gallstones between those patients whose original lesion was ulcerative colitis and those who had Crohn's disease. However, in patients who had less than 10 cm of the ileum removed, cholelithiasis was found in only 8 of the 54 patients who had colitis, but in 5 of the 11 who had Crohn's disease. It is suggested that some of the patients with Crohn's disease may have residual or recurrent intestinal disease that caused still further malabsorption of bile acids.

1434 EVIDENCE FOR THE EXISTENCE OF DEFINITIVE HEPATIC CHOLESTEROL PRECURSOR COMPARTMENTS FOR BILE ACIDS AND BILIARY CHOLESTEROL IN MAN.

(Eng.) Schwartz, C. C.; Vlahcevic, Z. R.; Halloran, L. G.; Gregory, D. H.; Meek, J. B.; Swell, L. (Veterans Admin. Hosp. Richmond, VA 23249). *Gastroenterology* 69(6):1379-1382; 1975.

The specific activity-time course curves of a bile fistula patient given both a constant infusion and a pulse of $[^3H]$mevalonic acid were studied to determine precursor-product relations between biliary cholesterol, plasma free cholesterol, and primary bile acids. These curves showed no precursor-product relation between biliary cholesterol, plasma free cholesterol, and bile acids. Both the constant infusion and pulse labeling data indicated that the bile acid precursor had a more rapid rate of turnover than plasma or biliary cholesterol; the biliary cholesterol precursor turned over more rapidly than plasma cholesterol. These data suggest the presence of multiple hepatic cholesterol precursor compartments and that in man, bile acids may be derived predominantly from newly synthesized cholesterol.

1435 A STRUCTURAL STUDY OF GALLSTONES.

(Eng.) Bills, P. M.; Lewis, D. (Univ. Surrey, Guildford, England). *Gut* 16(8):630-637; 1975.

Scanning electron microscopy and micro-x-radiography techniques were applied to a structural study of gallstones from 10 patients. Single and multiple cholesterol stones, calcium carbonate stones, calcium bilirubinate stones, and organic stones without cholesterol were studied. Large differences in structure were observed in stones of similar overall chemical composition. In some cholesterol stones containing calcium carbonate, the calcium carbonate was deposited very unevenly, indicating periods of little or no carbonate deposition during the growth of the stone. Calcium carbonate was often in the form of rare vaterite, and was often present as columns of small disoriented crystals. The cholesterol in such stones was often in large oriented flakes radiating from the center. Fibrous material was present at the center of many of the stones, and it is suggested that this material may have acted as a nucleus for the deposition of other components. No attempt was made to correlate the structure of the stones with the clinical course of the patient.

1436 BILE CANALICULAR ALKALINE PHOSPHATASE AND DISEASE.

(Eng.) Hagerstrand, I. (General Hosp., 214 01 Malmo, Sweden). *Acta Pathol. Microbiol. Scand.* [*A*] 84(3):271-277; 1976.

Seventy nine patients with canalicular alkaline phosphatase activity, without tumor involvement of the liver biopsy specimens were studied. No common causal factors were found for the increase in alkaline phosphatase of the human bile canaliculi. Most of the patients had received drugs and some of these may have influenced the canalicular alkaline phosphatase. Some of the patients were alcohol abusers. The frequency of the Z-gene of alpha-1-antitrypsin was high (9 individuals), 2.5 times higher than that observed in individuals in a random Swedish population. From the laboratory studies, a high sedimentation rate, an electrophoretic pattern of inflammatory reaction without any increase in immunoglobulins, and a moderate increase in serum alkaline phosphatase and gamma-glutamyl transferase activities were found to often coexist with an increased alkaline phosphatase of the bile canaliculi. Thrombocytosis, increased activities of aminotransferases, hepatomegaly, and mild bilirubinemia were less regular findings. Canalicular alkaline phosphatase activity was not related to sex or to blood group. No clinical or laboratory facts were common to all the patients.

1437 SPONTANEOUS BILIARY-ENTERIC FISTULAS: SOME CONSIDERATIONS ON THE MANAGEMENT OF GALLSTONES.

(Eng.) Wolloch, Y.; Glanz, I.; Dintsman, M. (Beilinson Medical Center, Petah Tikva, Israel). *Am. J. Surg.* 131(6):680-683; 1976.

The clinical presentation, diagnosis, treatment, and postoperative complications that occurred in 35 patients (25 women and 10 men, aged 40-81 yr) with biliary-enteric fistulas within the past 10 yr are reviewed. In 17 patients, the fistula was either suspected or diagnosed preoperatively; in 8 patients, the communication of the fistula with the intestine was demonstrated by barium meal, in 4 by barium enema, and in 1 by cholecystography. Three of the 31 patients who underwent surgery died postoperatively, and a fourth died 6 months later. Postoperative complications included burst abdomen (two patients), wound infection (two patients), and leakage from the duodenum with severe peritonitis (one patient). Six patients suffered from previous gallbladder symptoms, and seven others were known to have symptomatic gallstones for a short period varying from 3 months to 1 yr. The evidence indicates that the gallbladder can undergo recurrent episodes of inflammation to the point of fistula development, without any clinical signs and with only minimal symptoms. This supports an active surgical approach to cholelithiasis, even when silent stones are involved.

1438 THE MIRIZZI SYNDROME, INFLAMMATORY STRICTURE OF THE COMMON HEPATIC DUCT. (Eng.) Balthazar, E. J. (New York Medical Coll., Flower and Fifth Ave. Hosp., New York, NY). *Am. J. Gastroenterol.* 64(2):144-148; 1975.

A localized, reversible, inflammatory stricture of the common hepatic duct, secondary to cholelithiasis and cholecystitis (Mirizzi syndrome) is reported in a 47-yr-old man who presented with jaundice. Laparotomy demonstrated a large stone impacted in the neck of the gallbladder, compressing the hepatic artery and hepatic duct. The bile system was cannulated, and significant improvement was demonstrated after 7 weeks. The catheter was withdrawn and the patient was asymptomatic after 7 months. The characteristic roentgenological feature of the Mirizzi syndrome is the presence of broad extrinsic impressions on the lateral aspect of the common hepatic duct and hepatic artery.

1439 THE NORMAL AND PATHOLOGICAL ANATOMY OF THE BILIARY AND PANCREATIC DUCT SYSTEMS. (Ger.) Pliess, G. (Pathologischen Institut, Stadt Nurnberg, 8500 Nurnberg, Flurstr. 17, Germany). *Therapiewoche* 25(27):3763-3777; 1975.

1440 SURGICAL APPRAISAL OF SPHINCTER OF ODDI. (Eng.) Nagase, M.; Setoyama, M.; Nishijima, Y.; Kido, S.; Tanaka, T. (Kyoto Univ. Sch. Medicine, Sakyo-ku, Kyoto, Japan). *Arch. Jpn. Chir.* 44(4):365-369; 1975.

1441 INTRAHEPATIC PATTERN OF THE BILIARY DUCTS AND THEIR MAJOR VARIATIONS. (Eng.) Gupta, C. D.; Mittal, V. K.; Gupta, S. C. (S.N. Medical Coll., Agra, India). *Indian J. Med. Res.* 63(8):1130-1137; 1975.

1442 ABNORMALITIES OF THE COMMON BILE DUCT IN CHILDHOOD. (Ger.) Pegan, V.; Kovic, M.; Repse, S. (Clinical Surgery Gastroenterology, Univ., Zaloska 7, 61000 Ljubljana, Yugoslavia). *Z. Kinderchir. Grenzgeb.* 16(4):406-411; 1975.

1443 CHANGES OF THE BLOOD COAGULATION SYSTEM IN DIFFERENT REGIONS OF THE VASCULAR BED IN DISEASES OF THE BILIARY TRACT. (Rus.) Ternovoy, K. S.; Butylin, Y. P.; Migotin, S. V. (Ukrainian SSR Ministry of Health, Kiev, USSR). *Klin. Khir.* (5):43-48; 1975.

1444 TREATMENT OF GALLBLADDER DISEASE WITH COLRHEO (THEOPHYLLINE SODIUM GLYCINATE, INOSITOL, AND MAGNESIUM SULFATE). (Ger.) Orth, P.; Wieser, O. (Carinthian General Public Hosp., Klagenfurth, Austria). *Therapiewoche* 24(37): 4004, 4007-4008; 1974.

1445 INDICATIONS AND LONG-TERM RESULTS OF BILIODIGESTIVE ANASTOMOSIS IN THE LIGHT OF OUR EXPERIENCE. (Ita.) Jovino, R.; Di Salvo, E.; Renda, A.; Mazzitelli, M. (II Facolta di Medicina, Universita di Napoli, Italy). *Fegato* 20(1):37-50; 1974.

1446 IMPROVED METHOD OF OPERATIVE CHOLANGIOGRAPHY. (Eng.) Durst, A. L.; Aviad, I. (Hadassah Univ. Hosp., Jerusalem, Israel). *Int. Surg.* 60(10):552-554; 1975.

1447 CURRENT STATUS AND USEFULNESS OF OPERATIVE CHOLANGIOGRAPHY. (Eng.) Shipps, F. C. (Good Samaritan Hosp., Portland, OR). *CRC Crit. Rev. Clin. Radiol. Nucl. Med.* 7(3):243-262; 1976.

1448 CHOLEDOCHODUODENOSTOMY: AN ANSWER TO SOME BILIARY SURGICAL PROBLEMS. (Eng.) King, F. G. (3127 Atlantic Blvd., Jacksonville, FL 32207). *South. Med. J.* 69(4):517-519; 1976.

1449 HEPATICO-JEJUNO-DUODENOPLASTY IN REOPERATIVE SURGERY ON THE BILIARY TRACT. (Eng.) Grassi, G.; Broglia, S.; Dell'osso, A. (Ospedale S. Giovanni, Roma, Italy). *Chir. Gastroenterol.* 9(3):407-410; 1975.

1450 ENDOSCOPIC PAPILLOTOMY FOR CHOLEDOCHOLITHIASIS. (Eng.) Zimmon, D. S.; Falkenstein, D. B.; Kessler, R. E. (Manhattan Veterans Admin. Hosp., 408 First Ave., New York, NY 10010). *N. Engl. J. Med.* 293(23):1181-1183; 1975.

1451 OUR EXPERIENCE OF TRANSDUODENAL SPHINCTEROPLASTY FOR BILIARY DISEASE. (Eng.) Kusano, T.; Hamano, K.; Mikoschiba, Y.; Takada, T.; Takasaki, T.; Uchida, Y.; Watayo, T.; Hanyu, F.

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(Inst. Gastroenterology, Tokyo Women's Coll., Tokyo, Japan). *Chir. Gastroenterol.* 9(3):391-398; 1975.

1452 DISSOLUTION RATE STUDIES OF CHOLESTEROL MONOHYDRATE IN BILE ACID-LECITHIN SOLUTIONS USING THE ROTATING-DISK METHOD. (Eng.) Prakongpan, S.; Higuchi, W. I.; Kwan, K. H.; Molokhia, A. M. (No affiliation given). *J. Pharm. Sci.* 65(5):685-689; 1976.

1453 THE TREATMENT OF BILIARY ATRESIA. (Ger.) Muggiasca, F. (FMH Kinderchirurgia, Via Nassa 21, CH-6900 Lugano, Switzerland). *Z. Kinderchir. Grenzeb.* 17(1):55-60; 1975.

1454 RENAL UPTAKE OF ^{131}I-ROSE BENGAL IN BILIARY ATRESIA: A CASE REPORT. (Eng.) Heyman, S. (Red Cross War Memorial Children's Hosp., Cape Town, South Africa). *S. Afr. Med. J.* 50(4):103-105; 1976.

1455 DILATATION OF THE COMMON BILE DUCT AND GALLSTONE FORMATION. (Eng.) Nagase, M.; Setoyama, M.; Nishijima, Y.; Kido, S.; Tanaka, T. (Kyoto Univ. Sch. Medicine, Sakyo-ku, Kyoto, Japan). *Arch. Jpn. Chir.* 44(4):370-374; 1975.

1456 BACTERIOLOGICAL STUDY OF BILE SAMPLES FROM PATIENTS OPERATED ON FOR CHOLELITHIASIS. (Spa.) Arango, F. L.; Diaz, F. G. (Departamento de Cirugia, Universidad Antioquia, Medellin, Colombia). *Antioqua Med.* 24(6):515-523; 1974.

1457 STUDIES ON THE DISSOLUTION OF GALLSTONES WITH HEPARIN. (Ger.) Deltz, E.; Hantschmann, N. (Zentrum operative Medizin I, Christian-Albrechts-Universitat Kiel, D-23 Kiel, Germany). *Chirurg* 46(4):184-186; 1975.

1458 CHOLATE FORMATION AND CONJUGATION OF BILE ACIDS IN CHRONIC CALCULOUS AND NONCALCULOUS CHOLECYSTITIS. (Rus.) Karbach, Y. I.; Slivka, O. Y.; Shevchenko, L. T. (N. I. Pirogov Vinnitsa Medical Inst., Vinnitsa, USSR). *Ter. Arkh.* 47(2):104-108; 1975.

1459 CONDITION OF THE BILE DUCTS AT DIFFERENT PERIODS AFTER SUCCESSFUL SURGICAL TREATMENT OF CHOLELITHIASIS. (Rus.) Kishkovsky, A. N.; Nechai, A. I.; Lantsov, V. P.; Mitin, V. V. (S. M. Kirov Military Medical Academy, USSR). *Vestn. Rentgenol. Radiol.* (2):62-66; 1975.

1460 ANALYSIS OF LETHALITY IN PATIENTS WITH ACUTE CHOLECYSTITIS. (Rus.) Kotelnikov, V. P.; Potapov, A. A.; Titov, M. M. (Ryazan Medical Inst., Ryazan, USSR). *Klin. Khir.* (5):35-37; 1975.

1461 PROGNOSTIC MODELING OF CHOLECYSTITIS IN CONNECTION WITH SURGICAL TREATMENT. (Rus.) Tsukanov, Y. T. (Omsk Medical Inst., Omsk, USSR). *Klin. Khir.* (5):38-43; 1975.

1462 EMPHYSEMATOUS CHOLECYSTITIS: REPORT OF A CASE. (Eng.) Bonnabeau, R. C., Jr.; Tenekjian, V.; Djadalizadeh, M. (Cardiovascular Surgery, LTD, 590 Park St., Suite 406, St. Paul, MN 55103). *Am. Surg.* 42(5):352-354; 1976.

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1464 STATE OF PROTEOLYTIC ENZYMES IN CHRONIC ANGIOCHOLECYSTITIS. (Rus.) Revutskaia, A. E. (Kiev Research Inst. Pediatrics, Obstetrics, Gynecology, USSR). *Vrach. Delo* (3):77-81; 1975.

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See also, 0897, 0906, 0972, 1003, 1004, 1008, 1015, 1064, 1077, 1274, 1293, 1337, 1411.

GENERAL

1475 REVERSIBLE INTESTINAL MUCOSAL ABNORMALITY IN ACRODERMATITIS ENTEROPATHICA. (Eng.) Kelly, R.; Davidson, G. P.; Rugely, R.; Townley, W.; Campbell, P. E. (20 Collins St., Melbourne, Victoria, Australia 3000). *Arch. Dis. Child.* 51(3):219-222; 1976.

Three cases of acrodermatitis enteropathica that showed similar intestinal mucosal abnormalities on duodenal biopsy are presented. The patients ranged in age between 4-9 months. Initial biopsies taken before treatment showed loss of villous architecture with flattening of villi. There was increased cellularity in the lamina propria due to infiltration with inflammatory cells. The epithelial cells were cuboidal, and the nuclei were enlarged, more rounded, and less elongated with a more open chromatin distribution than normal. After treatment with expressed breast milk and p.o. di-iodohydroxyquinoline (900-1800 mg/day), the rash associated with the disease cleared, and there was partial re-establishment of the villous architecture and reduced cellular infiltration of the lamina propria. When this treatment was replaced by zinc sulfate (50 mg, 2-3 times/day), complete restoration of normal mucosa and complete clinical remission occurred.

1476 ABNORMAL INTESTINAL BILE ACID DISTRIBUTION IN AZOTAEMIC MAN: A POSSIBLE ROLE IN THE PATHOGENESIS OF URAEMIC DIARRHOEA. (Eng.) Gordon, S. J.; Miller, L. J.; Haeffner, L. J.; Kinsey, M. D.; Kowlessar, O. D. (Jefferson Medical Coll., 1025 Walnut St., Philadelphia, PA 19107). *Gut* 17(1):58-67; 1976.

Proximal intestinal bile acids were studied in 14 ambulatory patients with varying degrees of azotemia. The methyl ester-trifluoroacetate derivatives of intestinal and fecal samples were analyzed by gas liquid chromatography on glass columns. Azotemic patients had a significant decrease in deoxycholic acid when compared to nine normal subjects, 12% versus 28%, resp. Analysis of fecal bile acids of a patient with low intestinal deoxycholic acid also showed low deoxycholic acid with a preponderance of primary bile acids, in contrast with fecal bile acids of a normal subject and a patient with normal intestinal deoxycholic acid. It is suggested that impairment of deconjugation or 7α-dehydroxylation might be contributing to the low deoxycholic acid observed in azotemic patients. Unusual bile acids, i.e., ursodeoxycholic acid, 3-hydroxy-7-keto-cholanic acid, and 3,12-dihydroxy-7-keto-cholanic acid were also noted in intestinal aspirates of azotemic patients. The presence of these bile acids in conjunction with low deoxycholic acid correlated with the symptom of diarrhea in azotemic patients, and may contribute to the pathogenesis of diarrhea in these patients.

1477 WATERY DIARRHEA AND HYPOKALEMIA ASSOCIATED WITH INCREASED PLASMA VASOACTIVE INTESTINAL PEPTIDE IN A CHILD. (Eng.) Udall, J. N.; Singer, D. B.; Huang, C. T. L.; Nichols, B. L.; Ferry, G. D. (Baylor Coll. Medicine, Houston, TX). *J. Pediatr.* 88(5):819-821; 1976.

The case of a 7-yr-old boy with watery diarrhea, hypokalemia, normal pancreatic islet cells, and high plasma levels of vasoactive intestinal peptide (VIP) is presented. Small bowel biopsies p.o. showed severely flattened villi, elongation of the crypts, and increased mononuclear cells in the lamina propria. The patient had hypokalemia, flushing spells, and increased vasoactive intestinal peptide (0.7 ng/ml and 3.0 ng/ml in samples drawn on separate days), compatible with the watery diarrhea, hypokalemia, achlorhydria syndrome. Transit time from the ligament of Treitz to the anus was decreased (2 hr and 15 min). A primary disease process may have been responsible for the elevated VIP levels, but no pancreatic or other retroperitoneal tumor, or abnormal islet cells, were found at laparotomy or autopsy. Alternatively, the increased level may have been

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secondary to diffuse mucosal damage. It is concluded that further investigation of VIP levels in diarrheal conditions is necessary to determine this peptide's significance in pediatric patients.

1478 FINE STRUCTURE OF THE SMALL INTESTINAL MUCOSA IN INFANTILE MARASMIC MALNUTRITION. (Eng.) Brunser, O.; Castillo, C.; Araya, M. (Dept. Nutrition, Univ. Chile, Santiago, Chile). *Gastroenterology* 70(4):495-507; 1976.

The jejunal mucosa was studied in infantile marasmic malnutrition in the early phase after treatment was begun and before the onset of significant weight gain. In seven infants who had weights of at least 40% below normal, light microscopy before recovery showed that the mucosa was normal or midly abnormal in four, and moderately abnormal in three cases. Electron microscopy disclosed abnormalities of the brush border, large autophagosomes and residual bodies, and the deposition of collagen, filaments, and a dense, finely granular material below the basal lamella. Three infants were restudied during recovery. Although the histology remained unchanged, electron microscopy revealed improvement of the brush border, disappearance of the autophagosomes, and smaller and fewer residual bodies. The dense material below the basal lamella was absent whereas the fibrillar components remained. The authors suggest that the fine structural lesions observed may be due to the derangements in cell metabolism caused by the severe, prolonged restriction of protein and caloric intake.

1479 THERAPY WITH GASTRIN ANTIBODY IN THE ZOLLINGER-ELLISON SYNDROME. (Eng.) Hughes, W. S.; Hughes, J. B.; Ritzmann, S. E. (Dept. Medicine, Univ. Texas, Galveston, TX 77550). *Am. J. Dig. Dis.* 21(3):201-204; 1976.

The therapeutic effectiveness of parenterally administered rabbit antigastrin antibody was evaluated in a 27-yr-old woman with the Zollinger-Ellison syndrome and a fasting serum gastrin level of 3,020 pg/ml and a basal gastric acid secretion of 48.9 mEq/hr. Control globulin (5 ml) reduced gastric secretion to 32 mEq/hr. Gastrin antibody (5 ml) reduced it further to 8.7 mEq/hr. Betazole hydrochloride (1.5 mg/kg, s.c.), which was given 75 min after administration of gastrin antibody, stimulated acid secretion to 57.2 mEq/hr. One day later, basal acid secretion was uninhibited, although some antibody activity was present in the patient's serum. The results suggest that gastrin antibody acutely inhibits basal but not betazole-stimulated secretion. The authors conclude that gastrin antibody should not be used for the treatment of Zollinger-Ellison syndrome since the risk of anaphylaxis from this therapy outweighs the short term beneficial effect of acute administration of large amounts of gastrin antibody.

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GENERAL

Parasitology

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See also, 1012, 1245, 1420, 1468, 1472.

GENERAL

Regional Enteritis

1538 DEVELOPMENT OF A CROHN'S DISEASE ACTIVITY INDEX: NATIONAL COOPERATIVE CROHN'S DISEASE STUDY. (Eng.) Best, W. R.; Becktel, J. M.; Singleton, J. W.; Kern, F., Jr. (Hines Veterans Admin. Cooperative Studies Support Center, Hines IL). *Gastroenterology* 70(3):439-444; 1976.

A study was conducted to develop an index of the over-all activity of Crohn's disease. The study involved 112 patients with Crohn's disease of the small bowel (30%), colon (20%), or both (50%). Forty-six percent of the patients were female; 38% were less than 25 yr of age, while 27% were over 40. Over half of the patients were receiving azulfidine and almost half were receiving prednisone. Information on 18 predictor variables was gathered at each visit. Additionally, the physician rated his over-all evaluation of the patient's status and compared it to the previous visit. A multiple regression computer program was used to derive an equation for prediction of the physician's over-all ratings from a subset of the predictor variables fulfilling a combination of constraints. This equation, numerically simplified and utilizing eight selected variables (stools, pain, well-being, symptoms manifested, Lomotil, abdominal mass, hematocrit, and body weight), is the Crohn's Disease Activity Index (CDAI). Index values of 150 and below are associated with quiescent disease; values above that indicate active disease, and values over 450 are associated with extremely severe disease. The CDAI provides a uniform set of clinical parameters which

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can be assessed and recorded in the same way in each of several study centers over a period of years. The numerical index can be used as the principal measure of response to therapy and also can be used to tailor drug dosage to the individual needs of the patient. The CDAI has been used by the National Cooperative Crohn's Disease Study in following over 500 patients, since its inception in 1972.

1539 COURSE AND PROGNOSIS OF CROHN'S DISEASE.

(Eng.) Truelove, S. C.; Pena, A. S. (The Radcliffe Infirmary, Oxford, England). *Gut* 17(3): 192-201; 1976.

Data were collected from a group of 221 patients with Crohn's disease at the Radcliffe Infirmary, during 1938-1970 to obtain definite conclusions about the prognosis of this disease. Of these cases, 166 were new cases and 55 were referred from other institutions after primary diagnosis. These two groups are considered separately as the referred cases are not likely to represent the usual disease pattern. There were slightly more women than men and the predominant age of new cases ranged from the second to the fifth decades. Abdominal pain and diarrhea were common, accompanied by loss of weight, pyrexia, and anemia. Usually both small and large intestine were affected. Many patients showed an extension of their illness during follow-up. Medical measures consisted of treatment for anemia, vitamin supplements, codeine for control of diarrhea, and dietary measures. Corticosteroids and sulfasalazine were used in the 1950s, but immunosuppressive drugs were not used very often until after this series. Only 26% of the new cases and 7% of the referred cases escaped surgery. Many patients had multiple operations. Local complications occurred much more frequently among the referred cases. Acute dilatation of the colon was seen in only one and carcinoma of the colon was seen in four of the new cases. Systemic complications among new cases included arthritis (5), ankylosing spondylitis (3), erythema nodosum (4), and chronic liver disease (3). *Prima facie* evidence was obtained that Crohn's disease showed a fivefold increase over the period covered by this study. Out of 221 patients, Crohn's disease was the probable cause of death in 17 (7.7%). These data demonstrate that patients with Crohn's disease show a poorer rate of survival than the general population and the disease becomes progressively more deadly when it extends over a long period. Age has little effect on prognosis; sex has some influence, as females had a greater number of deaths over 5 yr. No significant differences in survival rate were found among the three main categories (small intestinal, ileocolitic, and primary colonic), but the number of patients in each category was small.

1540 STUDIES ON CROHN'S DISEASE: 1. THE RELATIONSHIP BETWEEN Yersinia enterocolitica INFECTION AND TERMINAL ILEITIS.

(Eng.) Persson, S.; Danielsson, D.; Kjellander, J.; Wallensten, S. (Central County Hosp., Orebro, Sweden). *Acta Chir. Scand.* 142(1):84-90; 1976.

Fifty-two patients with terminal ileitis or regional enterocolitis were examined for signs of infection due to *Yersinia enterocolitica* serotype 3. The patients were grouped according to the length of preoperative history. Among 18 patients with preoperative symptoms of 1 week or less, there were 9 with positive signs of *Yersinia enterocolitica* infection. None of these patients developed the chronic form of Crohn's disease, while two of the primarily *Yersinia*-negative patients progressed to the chronic form. One of nine patients with preoperative symptoms of 1 week to 3 months showed positive signs of *Yersinia enterocolitica* infection. This patient remained healthy, whereas seven of the negative ones progressed to the chronic form of Crohn's disease. None of the patients with established Crohn's disease of the chronic form had signs of recent *Yersinia* infection. The findings indicate that patients with acute terminal ileitis and positive signs of *Yersinia* infection do not usually progress to the chronic form of Crohn's disease. Bacteriologic and serologic investigation for *Yersinia* infection are therefore of prognostic value.

1541 LYMPHOCYTOTOXIC ANTIBODY IN INFLAMMATORY BOWEL DISEASE: A FAMILY STUDY.

(Eng.) Korsmeyer, S. J.; Williams, R. C., Jr.; Wilson, I. D.; Strickland, R. G. (Univ. New Mexico Sch. Medicine, Albuquerque, NM 87131). *N. Engl. J. Med.* 293(22):1117-1120; 1975.

A study of 90 relatives of 23 subjects with inflammatory bowel disease was undertaken to determine the frequency and expression of lymphocytotoxic antibody. Twenty-seven of the 90 relatives demonstrated lymphocytotoxic antibody by a microcytotoxicity method, as compared with only 3 of 69 age, sex, parity, and ethnically matched controls ($p<0.0001$). Decreased lymphocytotoxicity against lymphocytes from patients with inflammatory bowel disease as compared to normal donor lymphocytes previously demonstrated in the serum of probands was also observed in the sera from relatives of the probands. Nineteen of the 48 household contacts of probands were positive for antibody, in comparison with 8 of 42 nonhousehold contacts ($p<0.05$). Eight of 16 spouses of probands showed antibody. The increased prevalence of lymphocytotoxic antibody in family members of probands and its occurrence mainly in household contacts (consanguineous and nonconsanguineous) may indicate the exposure of probands and their relatives to a common environmental agent.

1542 CROHN'S DISEASE: CLINICAL, PATHOLOGICAL, AND ULTRASTRUCTURAL FEATURES.

(Spa.) Martinez, P. L. (Dept. Internal Medicine, Fundacion "Jimenez Diaz," Madrid, Spain). *Rev. Clin. Esp.* 134(1):1-16; 1974.

1543 EPIDEMIOLOGY OF CROHN'S DISEASE IN MARSEILLE.

(Fre.) Sarles, H.; Badatte, C. (No affiliation given). *Arch. Fr. Mal. App. Dig.* 64(3):274-275; 1975.

1544 CREATININE AND AMINO ACID PROFILES OF ILEAL AND FAECAL FLUIDS [Abstract]. (Eng.) Padovan, W.; Owens, C. W. I.; Ferguson, R. (Univ. Coll. Hosp. Medical Sch., Birmingham, England). *Clin. Sci. Mol. Med.* 49(3):27p; 1975.

1545 TRANSFER FACTOR IN THE TREATMENT OF CROHN'S DISEASE [Abstract]. (Eng.) Asquith, P.; Mallas, E.; Ross, I.; Montgomery, R. D.; Cooke, W. T.; Thompson, R. A. (Dept. Experimental Pathology, Univ. Birmingham, Birmingham, England). *Gut* 16(10): 832; 1975.

1546 COLONOSCOPIC MUCOSAL BIOPSIES IN CHRONIC INFLAMMATORY BOWEL DISEASE (CIBO): SPECIFICITY OF PATHOLOGIC DIAGNOSIS [Abstract]. (Eng.) Hogan, W. J.; Hensley, G. T.; Miller, W. N.; Ceenen, J. E. (Medical Coll. Wisconsin, Milwaukee, WI). *Gastrointest. Endosc.* 21(4):189; 1975.

1547 THE VALUE OF COLONOSCOPY FOR THE DIAGNOSIS OF CROHN'S DISEASE [Abstract]. (Eng.) Vantrappen, G.; Geboes, K. (Univ. Hosp. St. Rafael, Leuven, Belgium). *Gastrointest. Endosc.* 21(4): 196; 1975.

1548 COLONOSCOPY IN INFLAMMATORY BOWEL DISEASE. (Eng.) Tawile, N. T.; Priest, R. J.; Schuman, B. M. (Henry Ford Hosp., 2799 West Grand Blvd., Detroit, MI 48202). *Gastrointest. Endosc.* 22(1):11-13; 1975.

1549 CROHN'S DISEASE OF COLON PRESENTING AS IRRITABLE BOWEL SYNDROME. (Eng.) Ward, M. (Western General Hosp., Edinburgh, EH4 2XU, Scotland). *Br. Med. J.* 1(6012):748-749; 1976.

1550 CROHN'S DISEASE AND PSOAS ABSCESS. (Eng.) Ramus, N. I.; Shorey, B. A. (Bristol Royal Infirmary, England). *Br. Med. J.* 3(5983):574-575; 1975.

1551 CROHN'S DISEASE OF THE STOMACH. (Eng.) Gonzalez, G.; Kennedy, T. (Kansas Univ. Medical Center, Rainbow Blvd. at 39th St., Kansas City, KS 66103). *Radiology* 113(1):27-29; 1974.

See also, 0966, 0995, 0996, 0997, 1257, 1261, 1262.

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DEINHARDT, F.
1363*
DEKANSKI, J.B.
870
DEL CARMEN GARCIA VALLES, M.
1171

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DELANEY, T.J.
1498
DELAVIERRE, P.
1089, 1158
DELESTER, J.-P.
992
DELL'OSSO, A.
1449
DELL, R.B.
1365*
DELPIN, E.A.S.
895*
DELTZ, E.
1457
DEMEESTER, T.R.
1034
DEMERS, L.M.
983
DEMLING, L.
825*, 871*
DENCKER, H.
966*
DENES, L.
1411*
DENISIUK, V.K.
1228
DENPO, K.
1306*
DENT, J.
821*
DERACHE, R.
806
DESAI, H.G.
1236
DESAI, M.M.
1196
DESBAILLETS, L.
1019*
DESCHODT-LANCKMAN, M.
874*
DESPLACES, A.
913
DEVROEDE, G.
818*, 1208*
DEYHLE, P.
1044
DI SALVO, E.
1445
DIAKOVA, A.M.
1320
DIANZANI, F.
1384*
DIAZ, F.G.
1456
DIENSTAG, J.L.
1348*
DIETRICHSON, O.
1382*
DILS, R.
948
DIMARINO, A.J.
1024*
DIMITRIU, C.
1128
DINNO, M.A.
795*
DINTSMAN, M.
1437*
DIOGUARDI, N.
1325
DJADALIZADEH, M.
1462
DMITRIEVA, V.S.
1111
DOBBINS, J.W.
995
DOBBS, R.
847*
DOCIMO, R.
1127
DODDS, A.J.
1512
DODDS, W.J.
988
DOI, M.
1336*
DOMSCHKE, S.
825*, 871*
DOMSCHKE, W.
825*, 871*
DONOVAN, W.E.
939*
DONOWITZ, M.
945*
DORNER, M.
849*
DOUBLE, J.A.
1214
DOUGLASS, H.O.
1081
DOWLING, R.H.
1151*
DOWNING, D.
964
DRAPER, D.A.
1506
DREILING, D.A.
1273, 1391*, 1413*
DREW, R.
898*
DRYSDALE, S.
1523
DUBEY, D.P.
950
DUBOIS, F.
1208*
DUBREUIL, A.
1007
DUBROV, D.
803
DUCK, B.W.
1000
DUDENKO, F.I.
1228
DUGAS, M.C.
786*
DUMONDE, D.C.
1342*
DUPERRAY, B.
918
DUPUY, J.-M.
1300*
DUPUY, R.
1501
DURON, B.
832
DURST, A.L.
1446
DUTHIE, H.L.
820*
DUYS, P.
1402*
DYMOCK, I.W.
1138
DYRSZKA, H.
1072
EDDLESTON, A.L.W.F.
1368*, 1385*
EDGINGTON, T.S.
1360*
EDIS, A.J.
1097*
EIDELMAN, B.H.
896*
EISEMAN, B.
1430*
EISEN, H.J.
1346
EISNER, U.
803
EJSMONT, L.
1508
EKELUND, L.
966*
ELBAZ, J.
878
ELEY, K.G.
961
ELSTER, K.
1066
EMAS, S.
849*
ENGE, I.
925
ENJETTI, E.
1532
ENOCHS, M.R.
851*
ERLINGER, S.
1302*
ETIEVENT, J.
878
EVELAND, L.K.
1525
FAGNIEZ, P.-L.
1277
FAHRLAENDER, H.
975*
FALCHUK, Z.M.
1183*
FALCK, J.
1293
FALKENSTEIN, D.B.
1284, 1450
FARAJ, B.A.
1409*
FARDOU, H.
1203
FARINI, R.
1387
FARLEY, A.
1414*
FASTH, S.
1062*

FAURE, B.
1319
FAURE, J.L.
952
FAVERDIN, C.
1208*
FEHER, E.
784
FEHR, C.
975*
FEHR, H.F.
1049
FEISS, J.S.
1090
FELDMAN, E.J.
1151*
FELDMANN, G.
1302*
FELDMULLER, F.
1410*
FELIX, W.N.
1028
FELL, G.S.
1422
FELLOWS, K.E.
1401*
FELSHART, K.-J.
1240
FELTON, J.S.
841
FERDINANDUS, L.D.
812
FERGUSON, R.
1544
FERNANDES, J.
1318
FERRY, G.D.
1477*
FIERSTEIN, J.S.
787*
FIGUEROA, I.
895*
FILIPPINI, L.
1076
FILLIOS, L.C.
964
FINCH, S.C.
995
FINCKE, B.
1116
FINDLAY, J.M.
997, 1188
FINESTONE, S.M.
1348*
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801*
FISCHER, L.F.
882*
FISHER, M.M.
879*
FISHER, R.S.
974*
FITZGERALD, J.F.
812, 1246
FLATMARK, A.
1254*
FLUCKIGER, A.
1121
FORREST, A.P.M.
848*
FORSTNER, G.
944*
FORSTNER, G.G.
942*
FORSTNER, J.F.
942*
FORTH, W.
796*
FOSSATI, C.G.
1029
FOSTER, D.W.
917
FOUET, P.
1172
FOX, H.
1252*, 1258
FOX, J.M.
1065
FRANKEN, E.A.
1246
FRANKENBERG, B.E.
1039
FRANKLIN, R.H.
1027
FRASER, G.M.
997, 1264
FREEMAN, J.B.
1427*
FREENY, P.C.
1014
FRENKEL, E.P.
893*, 894*
FRENZEL, H.
785
FRETHEIM, B.
1254*
FREY, P.
1044, 1321
FRIEND, D.S.
774*
FRIMMER, M.
915
FRITSCH, P.
806
FROMMEL, D.
1300*
FROMMER, D.J.
977*
FUKUDA, S.
888*
FUKUHARA, M.
888*
FUNK, C.
1044
FUNOVICS, J.
885*
FURKA, I.
963
FURLANI, S.L.R.
1091
GABBIANI, G.
928
GABLER, H.
1470
GABR, Y.
1330
GAGRAT, B.M.
1196
GALAND, G.
944*
GALBRAITH, R.M.
1368*
GALLI, P.
776*
GAMET, D.J.
1246
GANCHROW, M.I.
1261
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1395
GARRETT, W.J.
1001
GARRIGUE, G.
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GARTNER, H.V.
1511
GASPARAITIS, A.
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GAUCHER, P.
1285
GAULL, G.E.
880*
GEBOES, K.
1547
GEELEN, M.J.H.
908
GEFFROY, Y.
1157
GEISSE, G.
1205*
GELBART, D.R.
795*
GENTON, N.
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1004
GERAUDIAS, P.
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1406*
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1356*
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1161
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1508
GIESE, R.W.
1013
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1313*
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GILLQUIST, J.
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GINSBERG, A.L.
1346

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GJONE, E.
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GLACCHINO, R.
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GLICKMAN, R.M.
943*
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1038
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1352*, 1482
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817*
GO, V.L.W.
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1307*
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833
GOKHBERG, S.L.
1266
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1021*
GOLDBERG, I.M.
1430*
GOLDBERG, J.P.
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965*, 1144*
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1015
GONVERS, J.-J.
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1551
GONZALEZ, L.
985
GOON, D.J.W.
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GORACZ, G.
1411*
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884*
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1368*
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GRABNER, G.
885*
GRABOWSKA-LUBASZKI, U.
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GRACEY, M.
1186
GRALA, T.
1113
GRAND, R.J.
1401*
GRANDGEORGE, M.
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GRANT, W.F.
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GRASSI, G.
1133, 1449
GRASSI, G.B., JR.
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GRAY, G.M.
1194
GRAZIANI, E.N.
1112
GREBENEVA, L.S.
1489
GREEN, F.
1258
GREEN, F.H.Y.
1252*
GREEN, S.G.
1149*
GREENE, H.L.
891*
GREENFIELD, N.J.
889*
GREGG, R.V.
1060*
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1434*
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1488
GRISHAM, J.W.
773*
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1219
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868, 1109
GRUNER, O.P.N.
1254*
GRUNNET, N.
890*
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GUARASCI, G.
1019*
GUIVARC'H, M.
1130
GUNTHER, K.
1311*
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1441
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950
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1118, 1467
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1441
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1184*
GUSTAFSON, A.
1326
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1225
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975*
GYURKO, G.
963
HAAGA, J.
985
HABIB GUIRGUIS, A.
1132
HACKENBROCK, C.R.
894*
HAEFFNER, L.J.
1476*
HAGEMANN, R.F.
951
HAGERSTRAND, I.
1304*, 1436*
HAGLER, L.
891*
HALL, R.T.
994
HALL, W.H.
1070
HALLAUER, W.
1511
HALLBERG, M.C.
1149*
HALLORAN, L.G.
1434*
HALPIN, T.C.
1193
HALSTED, C.H.
1199
HAMADA, M.
1078
HAMANO, K.
1451
HAMBLIN, A.
1342*
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968*
HAMMOU, J.-C.
1042
HANKWITZ, R.
1487
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HANSKY, J.
821*, 1071
HANTSCHMANN, N.
1457
HANYU, F.
1451
HARA, M.
1054*

HARDOUIN, J.-P.
1244
HARNED, R.K.
969*
HARPER, P.S.
1494
HARRIES, J.T.
772*
HASELBACH, H.
1083
HASHIMOTO, J.
1077
HASHIMOTO, K.
872*
HASHMONAI, M.
1468
HASIK, J.
1113
HATTERY, R.R.
984
HAUGEN, H.F.
1303*
HAUTMANN, H.
1143
HAVEL, R.J.
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1041
HAYAMI, A.
1011
HAZLEWOOD, C.F.
957*
HEATHCOTE, J.
1403*
HEIMANN, G.
802
HELM, J.
813*
HEMET, J.
1157
HENDREN, W.H.
1316
HENDRY, J.H.
936*
HENKIN, R.I.
1365*
HENMAN, F.D.
860
HENRICH, H.
909
HENRY-BIABAUD, E.
1103*
HENRY, J.C.
878
HENSLE, T.
1329
HENSLEY, G.T.
1546
HERASME, V.M.
1184*
HERMAN, R.H.
891*
HERMANN, R.E.
1428*
HERNANDEZ-GUIO, C.
1388
HEROLD, S.L.
1205*
HERRERIAS GUTIERREZ, J.M.
1496
HERRUZO, J.A.S.
1338
HERSEY, P.
1253*
HETLAND, O.
1278
HETTA, F.
1132
HEULLY, F.
1285
HEYMAN, S.
1454
HIGUCHI, W.I.
1452
HILL, C.R.
1002
HILL, G.L.
1433*
HILLEMAN, M.R.
1349*, 1350*, 1371
HILLEMAND, P.
1089
HIPOLITO-REIS, C.
924
HIRSCHOWITZ, B.I.
1344*
HO, B.C.
1529
HOFSTETTER, J.-R.
1121
HOGAN, W.J.
1546
HOLDSWORTH, E.S.
794*
HOLLAND, P.V.
1355*
HOLLENBECK, J.I.
1314
HOLLER, A.
1298
HOLLEY, P.
1344*
HOLLOS, I.
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HOLLWARTH, M.
1083
HOLMES, A.W.
1363*
HOLSCHNEIDER, A.M.
1209*
HOLST, J.J.
777*, 852*, 855*
HOLT, J.F.
1242
HOLT, P.R.
1166
HOLUB, B.J.
921
HOLYOKE, E.D.
1081
HOLZBACH, R.T.
897*
HOLZHAUSEN, H.
1280
HOOFNAGLE, J.H.
1354*, 1356*
HOOGENRAAD, N.J.
1308*
HOPPE-ESEYLER, G.
1511
HORINO, K.
1306*
HORNICK, R.B.
1521
HORROCKS, J.C.
1504
HOUGHTON-ALLEN, B.W.
1052
HOWILER, W.
1021*
HRYNIEWIECKI, L.
1113
HUANG, C.T.L.
1477*
HUANG, K.C.
795*
HUBER, J.
1318
HUBER, W.G.
1523
HUBSCHMANN, K.
1255
HUCK, S.
833
HUCKER, H.
785
HUELIN BENITEZ, J.
1063
HUET, M.
1414*
HUGGINS, D.
1531
HUGH, T.B.
1512
HUGHES, J.B.
1479*
HUGHES, W.S.
1479*
HULME, B.
811
HULTEN, L.
1062*
HUNT, D.R.
848*
HUNT, J.H.
987
HUNZIKER, H.R.
1049
HUREAU, J.
1089
HURWITZ, S.
803
HUTTO, J.H.
1386
HYLANDER, E.
996
IJAIYA, K.
1255
IMASATO, K.
1078
IMAZ JIMENEZ, V.P.
1471
IMBEMBO, A.L.
1166

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INBERG, M.V.
1041
IPPOLITI, A.F.
1099*
IRII, T.
1306*
IRWIN, G.R.
1362*
ISAAC, O.
863
ISAACS, J.W.
1409*
ISENBERG, J.I.
1094*, 1099*, 1109
ISHIKAWA, H.
1336*
ISMAILOV, A.K.
1226
ISSELBACHER, K.J.
789*
ITTENSOHN, O.L.
1350*, 1371
IWAMIYA, K.
1054*
IWARSON, S.
1357*
IWATSUKI, K.
873*
JACKSON, B.T.
886*
JACKSON, D.C.
979
JACOB, E.
1091
JACOBI, H.
1333
JAEGER, E.
825*
JAHNBERG, T.
1062*
JAIN, S.
1408*
JALUVKA, V.
1240
JAMES, A.E., JR.
864
JAMES, H.
1408*
JAMES, V.H.T.
811
JAMWAL, D.S.
1337
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1268
JANRUM, S.
996
JANSSEN, P.A.J.
1526
JAUCH, R.
1487
JAYA, T.V.
947
JAYABOSE, S.
1347
JEANPIERRE, R.
1285
JELDEN, G.
985
JELONEK, A.
1502
JENKINS, D.J.A.
815*
JEWELL, D.P.
1253*
JEZEQUEL, C.
1469
JOHANSEN, A.
777*
JOHNSON, J.D.
1195
JOHNSON, L.R.
851*
JOHNSON, P.
1326
JOHNSRUDE, I.S.
979
JOHNSTON, H.H.
1259
JONES, C.E.
1215
JONES, J.V.
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JONES, R.T.
1313*
JORDAN, J.E.
794*
JORDAN, P.H., JR.
1134
JORDO, L.
912
JORGE, E.
1537
JORGENSEN, A.J.F.
922
JORGENSEN, B.
1148*
JOSHI, V.V.
1506
JOVINO, R.
1445
JUHL, E.
1405*
JUNG-CAILLOL, M.-C.
832
JUNGE, U.
1358*
KAESS, H.
849*
KAHN, J.
878
KALAJA, E.
855*
KALATCHEVA, T.N.
875
KALUGINA, G.V.
1232
KANAHARA, H.
1055*
KANEMATSU, H.
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902, 1407*
KAPIKIAN, A.Z.
1348*
KAPLAN, E.
1101*
KARBACH, Y.I.
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KARCZEWSKA, K.
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KARHOFF, B.
1173
KARLE, H.
996
KARWACKI, J.J.
1362*
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KASHERENKOV, V.F.
1223
KASLIWAL, R.M.
1420
KASSNER, E.G.
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KATON, R.M.
1014
KATONIN, V.A.
1010
KATZ, A.J.
1183*
KAUR, A.
950
KAVUNENKO, A.P.
875
KAYE, C.M.
1200
KAYE, G.I.
1307*
KAYE, M.D.
819*
KEALY, W.F.
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KEELING, J.W.
772*, 1182*
KEENAN, E.
794*
KELLEHER, J.
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KELLNER, E.
1209*
KELLY, R.
1475*
KENG, N.B.
1043
KENNEDY, T.
1551
KENNEY, M.
1525
KENT, T.H.
828*, 1057*
KEPES, J.J.
1197
KERN, F., JR
1538*
KERSCHEN, A.
999
KESSLER, R.E.
1284, 1450
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945*
KEWENTER, J.
778*
KEYMER, I.F.
1260

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903
KHODORCHUK, N.I.
1332
KHOMIAKOV, I.S.
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KHOROSHKEVICH, G.V.
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KHUBCHANDANI, I.T.
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KIBRICK, S.
964
KIDO, S.
1440, 1455
KIESEL, J.L.
1299*
KIM, B.
1035
KIM, S.K.
1168
KIM, Y.S.
946*
KIMURA, K.
888*
KIN, S.H.
1316
KIND, M.
1466
KING, F.G.
1448
KING, J.F.
1484
KINJO, T.
1011
KINSEY, M.D.
1476*
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KIRWAN, W.O.
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KISHKOVSKY, A.N.
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1540*
KLATSKIN, G.
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846
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KLINGE, E.
1265
KLOTZ, D.H., JR.
1053
KNOBLAUCH. M.
1044, 1321
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1307*
KNUDSEN, J.B.
777*
KNUTSON, C.O.
1215
KOBAYASHI, T.
1379
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1296
KOCHINA, E.N.
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KOCIAN, J.
1190
KOFF, R.S.
1344*
KOGEL, H.
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KOIVULA, T.
892*
KOIZUMI, T.
887*
KOLODEJ, A.
835
KONIK, R.
1502
KONTUREK, S.J.
853*, 856*, 871*
KOO, C.
949
KORENEV, N.N.
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KOROLENKO, T.A.
911
KORSMEYER, S.J.
1541*
KOSAKA, K.
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1375
KOSSOFF, G.
1001
KOSTER, J.F.
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KOVIC, M.
1442
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KOWLESSAR, O.D.
1476*
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1502
KRASNER, N.
1392*
KREDEL, L.
1515
KRETCHMER, N.
1195
KRETSCHMER, G.
885*
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1106*
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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED_{50}	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
μg	microgram(s)
Hz	Hertz
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K_m	Michaelis constant
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
μM	micromolar; micromole(s)
ma	milliampere(s)
mCi, μCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)
ml, μl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

1552 MORPHOLOGY AND FUNCTION OF THE DOG ILEUM AFTER MECHANICAL OCCLUSION. (Eng.) Mirkovitch, V.; Cobo, F.; Robinson, J. W. L.; Menge, H.; Gomba, S. (Hopital Cantonal Universitaire, CH-1011 Lausanne, Switzerland). *Clin. Sci. Mol. Med.* 50(2):123-130; 1976.

To study the mucosal changes in the occluded intestine, complete mechanical occlusion of the ileum was produced in dogs, and the loops above and below the obstruction were examined functionally and morphologically 4 or 7 days later. The intraluminal pressure in the occluded loop never exceeded 8 cm water. The mucosa above the obstruction secreted water and ions into the lumen *in vivo*, although it absorbed glucose normally. Mucosal slices also absorbed amino acids and monosaccharides normally *in vitro*. The mucosa below the obstruction absorbed ions and glucose *in vivo* and nonelectrolytes *in vitro* to a slightly smaller extent than normal intestine. The morphological changes above the occlusion included shorter, plumper villi and shorter crypts, a reduction in histochemically stainable brush-border enzymes, but an increase in acid phosphatase. Below the obstruction, there was atrophy of the villi and crypts and reductions in all enzymes studied. The results suggest that the mucosa above the occlusion possesses an intact and almost normal epithelial layer, but that it has been stimulated to secrete *in vivo*, presumably by intraluminal factors. True atrophy of the mucosa occurred below the obstruction. It is suggested that diminished intraluminal nutrition is responsible for these changes.

1553 A METHOD FOR PREPARING ISOLATED GLANDS FROM THE RABBIT GASTRIC MUCOSA. (Eng.) Berglindh, T.; Obrink, K. J. (Biomedical Center, Univ. Uppsala, Uppsala, Sweden). *Acta Physiol. Scand.* 96(2):150-159; 1976.

A method for isolating gastric glands from the corpus of the rabbit gastric mucosa is presented. The stomach of an anesthetized rabbit was perfused with saline under high pressure through the aorta, taken out, and emptied. The mucosa was stripped off, minced into small pieces, and transferred to a 1 mg/ml collagenase solution. After 90 min at 37 C, a large number of isolated gastric glands and cells were separated. By a simple washing procedure, the glands were freed from cell contamination and collagenase. Using these techniques, gastric glands were viable, as demonstrated by a dye exclusion technique, oxygen consumption, and electrolyte content. For identification of the glandular cells both common staining techniques and electron microscopy were used. Four types of cells were identified: parietal cells, zymogen cells, mucous neck cells, and some endocrine cells. The intracellular morphology of the glandular cells did not differ significantly from that seen in intact gastric mucosa. The glands were stimulated with histamine in a dose-response manner, as revealed by the increase in oxygen consumption (ED_{50}=3 x 10^{-6} M). This isolated gastric gland preparation may serve as a useful tool for new approaches in gastric physiology.

1554 DEMONSTRATION OF THE FUZZY SURFACE COAT OF RAT INTESTINAL MICROVILLI BY FREEZE-ETCHING. (Eng.) Swift, J. G.; Mukherjee, T. M (Inst. Medical, Veterinary Science, Adelaide, South Australia 5000). *J. Cell Biol.* 69(2):491-495; 1976.

The fuzzy surface coat of mucosal cells of the rat rectum was clearly demonstrated by standard freeze-etching procedures. In replicas, the surface coat thickness was seen to be uniform for a particular cell, but it varied among different cells. In contrast to the close-packed layer of branching surface coat filaments observed in most studies of conventionally processed tissues, freeze-etching showed long straight filaments without branching. These were aligned in parallel with one another and with the long axes of the microvilli. The appearance of the surface coat differed substantially from that found in previous thin-section and freeze-etch studies. The significant increase in surface area available for direct contact with substances in the lumen suggests a greater functional role for the surface coat filaments.

1555 THE EFFECT OF PARTIAL STARVATION AND GLUCAGON TREATMENT ON INTESTINAL VILLUS MORPHOLOGY AND CELL MIGRATION. (Eng.) Rudo, N. D.; Rosenberg, I. H.; Wissler, R. W. (Univ. Chicago, Pritzker Sch. Medicine, Chicago, IL). *Proc. Soc. Exp. Biol. Med.* 152(2):277-280; 1976.

The effect of prolonged exposure to augmented glucagon serum concentrations on intestinal mucosal structure and function was investigated in male Sprague-Dawley rats with hormone- or starvation-induced hyperglucagonemia. The rats were either treated with repeated i.p. injections of glucagon (50 µg every 6 hr) or they were partially starved. After 7 days of partial starvation or 5 days of glucagon injections (a time period shown previously to induce increased transport), all animals were sacrificed and a segment of jejunum was removed, fixed in formalin, sectioned, and dipped in Kodak NTB-2 liquid emulsion. After 8 weeks of exposure, the autoradiographs were developed; assessments of villus height and crypt depth and measurements of length of the column of exposed grains were made in a calibrated microscope. The mean villus length in both semistarved and glucagon-treated groups was found to be significantly reduced ($p<0.001$) when compared to control animals. The crypt-to-villus ratio was unaltered by either treatment modality. The rate of cell migration was diminished by both partial starvation and glucagon treatment, but only

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glucagon therapy was found to cause a significant ($p<0.01$) reduction in the rate of cell movement when compared to controls.

1556 HISTOLOGICAL STUDIES ON THE REGENERATION OF SMALL-INTESTINE EPITHELIUM OF RATS IRRADIATED WITH SUBLETHAL DOSES OF X RAYS. (Eng.) Lewicki, Z.; Figurski, R.; Sulikowska, A. (Zaklad Patofizjologii Komorki, ul. Marymoncka 99/101, 01-813 Warsaw, Poland). *Pol. Med. Sci. Hist. Bull.* 15/3(5/6):539-549; 1975.

The dynamics of regeneration of small-intestine epithelium was studied in 62 rats x-irradiated with sublethal doses (550, 600, or 750 R). Twenty-two non-irradiated control animals were used. Specimens of duodenum and jejunum were examined histologically at 1, 2, 4, 6, 8, 14, and 25 days after irradiation. The intestinal villi became shorter and deformed only 1-2 days following irradiation. The blood vessels were damaged, the enterocytes showed features of degeneration and vacuolization, and the epithelium was detached by the exudate accumulating in the stroma. The regeneration of intestinal epithelium was markedly disturbed during days 1-6. On the first and second days after irradiation, the number of epithelial cells of the villi, and particularly of young cryptal ones, markedly dropped. On the fourth and sixth days, increased proliferation of young cryptal cells surpassed the physiological rate. The accompanying disturbances in differentiation consisted of a decreased acidophilic to basophilic cell ratio, and a retardation of maturation of goblet cells. The absolute number of goblet cells in PAS-stained sections was increased, as was their proportion to the number of enterocytes.

1557 BIOCHEMICAL AND MORPHOLOGICAL STUDIES ON HUMAN JEJUNAL MUCOSA MAINTAINED IN CULTURE. (Eng.) L'Hirondel, C.; Doe, W. F.; Peters, T. J. (Royal Postgraduate Medical Sch., Du Cane Rd., London W12 OHS, England). *Clin. Sci. Mol. Med.* 50(5): 425-429; 1976.

The combination of a wire-mesh support with the roller-tube technique is described as a procedure for the culture of human jejunal mucosa *in vitro*. The technique was applied to fragments (approximately 10 mg) of jejunal biopsies from 11 normal subjects and from five patients with celiac disease. The cultured tissue was shown by radioautography to incorporate ^{3}H-leucine into proteins of the villus epithelial cells and ^{3}H-thymidine into nucleic acid, predominantly by the enteroblasts. Although the tissue protein and DNA contents fell during culture, the combined tissue and medium DNA content remained constant during culture and could be used as a reference for enzyme and biochemical studies on cultured intestinal biopsies. The authors conclude that jejunal mucosa cultured by the improved roller-tube technique maintains its integrity and displays the usual parameters used to characterize previous culture techniques.

1558 STRUCTURAL CHANGES ASSOCIATED WITH PAROTID "DEGENERATION SECRETION" AFTER POST-GANGLIONIC SYMPATHECTOMY IN RATS. (Eng.) Garrett, J. R.; Thulin, A. (King's Coll. Hosp. Dental Sch., London, England). *Cell Tissue Res.* 162(1):1-12; 1975.

1559 RIBONUCLEOPROTEIN COMPONENTS IN LIVER CELL NUCLEI AS VISUALIZED BY CRYOULTRAMICROTOMY (Eng.) Puvion, E.; Bernhard, W. (Institut de Recherches Scientifiques sur le Cancer, 94800 Villejuif, France). *J. Cell Biol.* 67(1):200-214; 1975.

1560 MYOID FIBRILS IN EPITHELIAL CELLS: STUDIE OF INTESTINE, BILIARY AND PANCREATIC PATHWAYS, TRACHEA, BRONCHI, AND TESTIS. (Eng.) Puchtle H.; Waldrop, F. S.; Meloan, S. N.; Branch, B. W. (Medical Coll. Georgia, Augusta, GA). *Histochemistr* 44(2):105-118; 1975.

1561 SCANNING ELECTRON MICROSCOPIC STUDIES OF MOUSE INTESTINAL MUCOSA AFTER GAMMA AND NEUTRON IRRADIATION [Abstract]. (Eng.) Carr, K. E.; Toner, P. G.; Hamlet, R.; Nias, A. H. W. (Dept. Anatomy and Pathology, Glasgow Univ., Glasgow G31 4PG, Scotland). *Proc. Br. Inst. Radiol.* 48(571): 608; 1975.

1562 SEQUENTIAL MORPHOLOGICAL CHANGES OF ULCERATION IN THE GLANDULAR STOMACH OF RATS INDUCED BY IODOACETAMIDE. (Eng.) Shirai, T.; Takahashi, M.; Fukushima, S.; Tatematsu, M.; Hananouchi, Ito, N. (First Dept. Pathology, Nagoya City Univ., Medical Sch., Nagoya, Japan). *Acta Pathol. Jpn.* 25(4 463-476; 1975.

1563 ELECTRON MICROSCOPIC OBSERVATIONS ON THE INNERVATION OF THE SPHINCTER OF ODDI IN THE DOG. (Eng.) Kyosola, K.; Reehardt, L. (Dept. Anatomy, Univ. Helsinki, Siltavuorenpenger 20b, 00170 Helsinki 17, Finland). *Cell Tissue Res.* 161(2):167-176; 1975.

1564 POSTIRRADIATION REGENERATION OF INTESTINAL EPITHELIUM IN W/W^v AND Sl/Sl^d GENETICALLY ANEMIC MICE. (Eng.) Hopper, A. F.; Russell, E. S. (Dept. Zoology, Rutgers, State Univ., New Brunswick, NJ 08903). *Radiat. Res.* 63(2):310-319; 1975. 1975.

See also, 1574, 1580, 1609, 1613, 1635, 1723, 2143.

1565 ASPECTS OF INTESTINAL FOLATE TRANSPORT IN THE RAT. (Eng.) Blair, J. A.; Johnson, I. T.; Matty, A. J. (Dept. Chemistry, Univ. Aston in Birmingham, Gosta Green, Birmingham B4 7ET, England). *J. Physiol. (London)* 256(1):197-208; 1976.

In vitro preparations of Wistar rat jejunum were used to study the metabolic dependence, the structural specificity, and the pH sensitivity of the folic acid absorption process. The presence of 2:4 dinitrophenol, and the absence of oxygen in the mucosal bathing medium led to a decrease in the tissue accumulation and serosal transfer of folic acid by everted sacs. 10-Formylfolic acid, present in the mucosal medium at a molar ratio of 10:1 with labeled folic acid, appeared to compete for tissue accumulation sites, but had no significant effect on serosal transfer. The efflux of folic acid from preloaded jejunal sacs was stimulated by the presence in the mucosal medium of folic acid and related compounds. Pteroyl-L-glutamic acid, 10-formylfolic acid, and methotrexate elicited a significant increase in the efflux rate; pteroyl-D-glutamic acid was significantly less effective, and pteroic acid had no effect. The uptake of folic acid by isolated jejunal cells, which were prepared by enzymic disaggregation of the mucosa, was found to be influenced by the pH of the bathing medium, uptake being enhanced at a pH of 5-6. It is concluded that the effect of metabolic inhibitors and acid pH conditions on the uptake of folic acid *in vitro* is consistent with a passive absorption mechanism, influenced in intact preparations and *in vivo* by the jejunal pH microclimate. However, the occurrence of competitive inhibition and stimulated efflux may indicate the existence of a structurally specific accumulation process at some site(s) within the mucosa.

1566 TRANSPORT OF 3-o-METHYL D-GLUCOSE AND β-METHYL D-GLUCOSIDE BY RABBIT ILEUM. (Eng.) Holman, G. D.; Naftalin, R. J. (Dept. Physiology, Univ. London, London WC2R 2LS, U.K.). *Biochim. Biophys. Acta* 433(3):597-614; 1976.

The intestinal transport of β-methyl glucose, 3-*O*-methyl glucose, and D-galactose were studied to determine common features of these actively transported sugars. The apparent affinity constants at the brush border indicated that sugars are selected in the order: β-methyl glucose, D-galactose, and 3-*O*-methyl glucose (the K_m values were 1.23, 5.0, and 18.1 mM, resp.). At low substrate concentrations, the K_t values for Na^+ activation of sugar entry across the brush-border were: 27, 25, and 140 mEq for β-methyl glucose, galactose and 3-*O*-methylglucose, resp. These kinetic parameters suggest that Na^+, water, sugar, and membrane-binding groups are all factors that determine selective affinity. In spite of these differences in operational affinity, all three sugars showed a reciprocal change in brush border entry and exit permeability as Ringer Na or sugar concentration was increased. Estimates of the changes in convective velocity and in the diffusive velocity when the sugar concentration in the Ringer was raised revealed that with all three sugars, the fractional reduction in convective velocity was approximately equal to the (reduction of diffusive velocity)^2. This is consistent with the view that the sugars move via pores in the brush border by convective diffusion. Theophylline reduced the serosal border permeability to β-methyl glucose and to 3-*O*-methyl glucose relatively by the same extent and, consequently, it increased the intracellular accumulation of these sugars. The permeability of the serosal border to β-methyl glucose entry was lower than permeability of the serosal border to β-methyl glucose exit, which suggests that β-methyl glucose may be convected out of the cell across the lateral serosal border.

1567 THE ROLE OF STIMULATED AMINO ACID TRANSPORT IN PROMOTING GLYCOGENESIS IN THE IRRADIATED RAT. (Eng.) Kilberg, M. S.; Neuhaus, O. W. (Univ. South Dakota, Sch. Medicine, Vermillion, SD 57069). *Radiat. Res.* 66(3):597-608; 1976.

Male Sprague-Dawley rats were exposed to two doses of γ rays, (2500 and 1500 r) to demonstrate that hepatic amino acid transport is an important factor in controlling metabolism in the liver, following whole-body exposure to ionizing radiation. Following exposure to 2500 r, the hepatic free amino acids were elevated during the first 48 hr accompanied by a decline in serum levels. At 72 hr, the hepatic amino acids diminished to the control levels, while the serum increased abruptly. In contrast, 72 hr after exposure to 1500 r, the serum amino acid levels increased only 27%, and the hepatic amino acid values increased 52%. These results are explained on the basis of the changes in α-aminoisobutyric acid transport. The incorporation of ^{14}C from labeled L-alanine into hepatic glycogen was maximal 48 hr postexposure to 2500 r, but it declined to below control values at 72 hr. On the other hand, exposure to 1500 r resulted in maximal incorporation of ^{14}C at both 48 and 72 hr. It is proposed that amino acid transport into liver cells is stimulated by the elevated blood levels of amino acids released from the degradation of protein. The transport increased the levels of hepatic free amino acid and is, therefore, a key factor in regulating postirradiation glycogenesis.

1568 EFFECTS OF SALICYLATE AND BILE SALT ON ION TRANSPORT BY ISOLATED GASTRIC MUCOSA OF THE RABBIT. (Eng.) Fromm, D.; Schwartz, J. H.;

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Quijano, R. (Harvard Medical Sch., Boston, MA 02215). *Am. J. Physiol.* 230(2):319-326; 1976.

The effects of luminal addition of salicylate and taurocholate on ion transport by rabbit fundic mucosa were examined *in vitro* using isotopic and pH stat techniques. Salicylate (3 mM) did not alter ion transport, but 20 mM caused a 40% decrease in the acid secretory rate. Taurocholate (20 mM) caused a transient, apparent cessation of acid secretion followed by stimulation. Salicylate (3 or 20 mM) increased Na$^+$ but not Cl$^-$ permeability at luminal pH 7. At luminal pH 4, however, salicylate increased Cl$^-$ in addition to Na$^+$ and H$^+$ permeability. Taurocholate (10 or 20 mM) increased both cation and anion permeability at pH 7 and pH 4. Addition of salicylate or taurocholate resulted in stimulation of net Na$^+$ transport. While salicylate and taurocholate increased cation permeability at pH 7, they have differing effects on acid secretion and anion permeability. These data suggest that salicylate and taurocholate alter cation permeability by different mechanisms. This is consistent with the concept that enhanced diffusion of H$^+$ into the tissue causes a nonspecific alteration in the permeability pathway.

1569 EFFECT OF BILE SALTS AND FATTY ACIDS ON THE COLONIC ABSORPTION OF OXALATE.

(Eng.) Dobbins, J. W.; Binder, H. J. (Dept. Internal Medicine, Yale Univ. 333 Cedar St., New Haven, CT 06510). *Gastroenterology* 70(6):1096-1100; 1976.

The effect of bile salts and fatty acids on colonic oxalate absorption was investigated in male Sprague-Dawley rats by an *in vivo* perfusion technique. The colon was perfused initially with a 140 mM NaCl control solution and then with the test solution of bile salts and fatty acids. During perfusion with 140 mM NaCl, absorption of 1.5 mM sodium oxalate was 34.2 ± 9.4 nmoles/min/g dry tissue weight, and water absorption was 102.3 ± 31.1 µl/min/g dry tissue weight. In contrast, oxalate absorption increased almost 10-fold to 330.4 nmoles/min/g dry tissue weight ($p<0.001$) during perfusion with 5 mM deoxycholate solution. 5 mM Taurocholate neither increased oxalate absorption nor altered water absorption. Perfusion with 5 mM deoxycholate resulted in a decreased transmural electrical potential difference (PD) from 20.9 ± 1.3 to 9.5 ± 2.6 mv ($n=5$, $p<0.02$). The absorption of 5 mM of urea increased from 254.6 ± 33.9 nmoles/min/g dry tissue weight during the control period to 1738.4 ± 345.9 nmoles/min/g dry tissue weight during perfusion with deoxycholate ($p<0.02$), despite simultaneous water secretion. Perfusion with 20 mM oleic acid increased oxalate absorption and significantly decreased water absorption, although 8 mM oleic acid did not significantly affect either oxalate or water absorption. In contrast, 20 mM octanoic acid, a medium chain fatty acid, did not significantly alter oxalate absorption. Water absorption increased during perfusion with octanoic acid. These results suggest that bile salts and fatty acids increase colonic absorption of oxalate by a nonspecific alteration of mucosal permeability.

1570 THE MECHANISM WHEREBY BILE ACID MICELLES INCREASE THE RATE OF FATTY ACID AND CHOLESTEROL UPTAKE INTO THE INTESTINAL MUCOSAL CELL.

(Eng.) Westergaard, H.; Dietschy, J. M. (Univ. Hosp., DK-2100 Copenhagen ϕ, Denmark). *J. Clin. Invest.* 58(1):97-108; 1976.

The mechanism whereby bile acid facilitates fatty acid and cholesterol uptake into the intestinal mucosal cell was investigated. The rate of uptake (Jd) of several fatty acids and cholesterol was initially found to be a linear function of the concentration of these molecules in the bulk phase, if the concentration of bile acid was kept constant. In contrast, Jd decreased markedly when the concentration of bile acid was increased relative to that of the probe molecule but it remained essentially constant when the concentration of both the bile acid and probe molecule was increased in parallel. In other studies, Jd for lauric acid measured from solutions containing either 0 or 20 mM taurodeoxycholate and saturated with the fatty acid equaled 79.8 ± 5.2 and 12.0 ± 9.4 nmol/min/100 mg, resp.; aft correction for unstirred layer resistance, however, the former value equaled 113.5 ± 7.1 nmol/min/100 mg. Maximum values of Jd for the saturated fatty acids with 12, 16, and 18 carbons equaled 120.8 ± 9.4, 24.1 ± 3.2, and 13.6 ± 1.1 nmol/min/100 mg, resp. Thes values essentially equaled those derived by multiplying the maximum solubility times the passive permeability coefficients appropriate for each of these compounds. The theoretical equations were then derived to define the expected behavior of Jd for the various lipids under these different experimental circumstances. The mechanism of absorption was assumed to occur either by uptake of the whole micelle, during interaction of the micelle with an infinite number of sites on the microvillus membrane or through a monomer phase of lipid molecules in equilibrium with the micelle. The results indicate that the principle role of the micelle in facilitating lipid absorption is to overcome unstirred layer resistance, while the actual process of fatty acid and cholesterol absorption occurs through a monomer phase in equilibrium with the micelle.

1571 INHIBITION OF NaCl ABSORPTION FROM PERFUSED RAT ILEUM BY FUROSEMIDE.

(Eng.) Humphreys, M. H. (San Francisco General Hosp., San Francisco, CA 94110). *Am. J. Physiol.* 230(6):1517-1523; 1976.

The effect of furosemide on intestinal absorption of water and electrolytes was studied using segments of Sprague-Dawley rat ileum perfused *in vivo*. Furosemide (1 mM) in the perfusion fluid reduced absorption of Na, Cl and water by 50% from a balanced electrolyte solution, without changing the transepithelial potential difference (PD). This effect was also observed in the absence of luminal glucose and was largely reversible. Substitution of all Na in perfusion fluid with choline produced secretion of Na and water and abolished Cl absorption; substitution of all Cl with SO$_4$ reduced Na absorption to 20% of control values. Under both of these conditions, furosemide had only trivial effects on electrolyte absorption and it exerted no effect on PD. Measurements of unidirectional fluxes of Na and Cl showed that furosemide decreased net flux by reducing lumen-to-blood flux of these ions rather than increasing blood-to-lumen flux. These results resemble those obtained in this tissue following exposure to acetazolamide, and suggest tnat furosemide inhibits a coupled, neutral process of NaCl transport from lumen to blood. Although this effect could be a result of carbonic anhydrase inhibition, it probably occurs from a separate action of furosemide on ileal transport.

1572 THIAMINE TRANSPORT ACROSS THE RAT INTESTINE. II. EFFECT OF ETHANOL. (Eng.)

Hoyumpa, A. M., Jr.; Breen, K. J.; Schenker, S.; Wilson, F. A. (Veterans Admin. Hosp., Nashville, TN 37203). *J. Lab. Clin. Med.* 86(5):803-816; 1975.

The effect of ethanol on thiamine transport was characterized in Sprague-Dawley rats. Intact isolated duodenal loops were used to measure rates of ^{35}S-thiamine hydrochloride absorption into the circulation *in vivo*, and everted jejunal segments were used to measure net transmural flux, unidirectional uptake, and cellular exit of ^{14}C-thiamine hydrochloride *in vitro*. Intragastric administration of ethanol (50-750 mg/100 g), given 1 hr before the experiment, reduced absorption of low thiamine concentration *in vivo* to 65.44% of the control value. A similar inhibition was noted after i.v. administered ethanol [25, 50, 250, 500, and 750 mg/100 g as 2.5, 5, 25, 50, and 39% (weight/volume) solutions, resp.]. Once attained, the inhibition of thiamine absorption was not related to the ethanol dose or to ethanol concentration in the blood or in the intestinal lumen; this inhibition was reversible. In contrast, ethanol did not affect absorption of high concentrations of thiamine. These findings were confirmed by the *in vitro* results. In transmural flux studies, the movement of low, but not of high, thiamine concentration against a concentration gradient was inhibited by ethanol, so that the normal serosal/mucosal ratio of 1.5 was reduced to 1.0. Ethanol did not affect unidirectional uptake into the mucosa of either low or high thiamine concentrations, but it did block cellular exit of low thiamine concentrations from the cells into the serosal compartment. Exit of high thiamine concentrations was not affected. Ouabain (100 μM), like ethanol, markedly reduced cellular exit but did not influence uptake of low thiamine concentrations. These studies suggest that ethanol adversely affects the active, but not the passive, component of thiamine transport. Moreover, ethanol appears to block thiamine exit from the cells but does not affect cellular uptake of thiamine. The similarity to ouabain action suggests that ethanol may impair active thiamine transport by inhibiting Na-K adenosine triphosphatase activity.

1573 SODIUM/PROTON ANTIPORT IN BRUSH-BORDER-MEMBRANE VESICLES ISOLATED FROM RAT SMALL INTESTINE AND KIDNEY. (Eng.)

Murer, H.; Hopfer, U.; Kinne, R. (Max-Planck-Institut fur Biophysik, Frankfurt/Main, W. Germany). *Biochem. J.* 154(3):597-604; 1976.

Studies on proton and Na$^+$ transport by isolated intestinal and renal brush border-membrane vesicles were performed in male Wistar rats to test for the presence of an Na$^+$/H$^+$-exchange system. Proton transport was evaluated as proton transfer from the intravesicular space to the incubation medium by monitoring pH changes in the membrane suspension induced by sudden addition of cations. Na$^+$ transport was determined as Na$^+$ uptake into the vesicles by a filtration technique. A sudden addition of sodium salts (but not choline) to the membrane suspension provoked an acidification of the incubation medium, which was abolished by the addition of 0.5% Triton X-100. Pretreatment of the membranes with Triton X-100 prevented the acidification. The acidification was not observed if the [K$^+$] and proton conductance of the membranes were increased by the simultaneous addition of valinomycin (1 μl) and carbonyl cyanide *p*-trifluoromethoxyphenylhydrazone (1 μl) to the K$^+$-rich incubation medium. Either valinomycin or carbonyl cyanide *p*-trifluoromethoxyphenylhydrazone, when added alone, did not alter the response of the membranes to the addition of Na$^+$. Na$^+$ uptake by brush border microvilli was enhanced in the presence of a proton gradient directed from the intravesicular space to the incubation medium. Under these conditions, a transient accumulation of Na$^+$ inside the vesicles was observed. It is concluded that intestinal and renal brush border membranes contain a Na$^+$/H$^+$ antiport system that catalyzes an electroneutral exchange of Na$^+$ against protons and consequently can produce a proton gradient in the presence of a concentration difference for Na$^+$. This system may be involved in the active proton secretion of the small intestine and the proximal tubule of the kidney.

1574 UPTAKE OF CIRCULATING IRON BY THE DUODENUM OF NORMAL MICE AND MICE WITH ALTERED IRON STORES, INCLUDING SEX-LINKED ANEMIA. HIGH RESOLUTION RADIOAUTOGRAPHIC STUDY. (Eng.)

Bedard, Y. C.; Pinkerton, P. H.; Simon, G. T. (Dept. Pathology, Univ. Toronto, Toronto, Ontario, Canada M5G 1L5). *Lab. Invest.* 34(6):611-615; 1976.

The deposition of i.v.-administered iron in the duodenal epithelium was studied by electron microscopy radioautography in normal mice, in iron-overloaded and iron-deficient mice, and in mice with X-linked anemia (gene symbol sla), 4 and 24 hr after injection of ^{59}Fe. The resolution of radioautography with ^{59}Fe was determined with a line source and the distance from the hot line within which half of the grains fell (HD value) was 1650 A. In normal, iron-overloaded, and sla mice, radioiron was localized in the undifferentiated crypt cells at 4 hr and in the absorptive cells of the luminal half of the villi, at 24 hr. At both times, the vast majority of the grains was seen over the areas rich in free ribosomes and rough endoplasmic reticulum. In iron-deficient mice, grains were not found at either

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time. The amount of iron incorporated in the crypt cells was related to the size of the body iron stores. It is postulated that the amount of iron incorporated in the crypt cells is the result of interaction between uptake and return to the blood of the circulating iron. Once the crypt cells have differentiated into absorptive cells, the uptake and recirculation of iron from and to the blood ceases, leaving an amount of "message" iron that determines the absorptive cell's subsequent capacity for iron transfer to the plasma. In sla mice, in spite of tissue iron deficiency, the amount of iron deposited was similar to that of normal mice and it was markedly increased after treatment of the anemia. The accumulation of iron in the crypt cells may result from the decreased return to the blood of the incorporated circulating iron, due to the postulated deficient iron carrier mechanism in sla, or it may be a consequence of increased avidity of the absorptive cells for circulating iron. In either event, the absorptive cell receives an inappropriate message with resulting inappropriate iron absorption.

1575 COLONIC ABSORPTION OF BACTERIALLY SYNTHESIZED VITAMIN K_2 IN THE RAT. (Eng.) Hollander, D.; Muralidhara, K. S.; Rim, E. (Harper Hosp., Detroit, MI 48201). *Am. J. Physiol.* 230(2):251-255; 1976.

Colonic absorption of bacterially synthesized vitamin K_2 ([^{3}H]menaquinone-9) was studied *in vitro* with everted rat colonic sacs. The mean rate of absorption of the vitamin by the colon was approximately 20 pmol/min/100 mg tissue at 300 nM mucosal concentration of the vitamin. The rate of absorption did not change with the addition of 2,4-dinitrophenol, Na azide, or KCN to the mucosal incubation medium. No evidence for transmural transport of the vitamin was detectable. When the concentration of vitamin K_2 was increased in a stepwise fashion up to 900 nM, the absorption rate remained linear with respect to the mucosal fluid concentration (r=0.98). Autoradiography indicated that the vitamin accumulated in the mucosal and submucosal layers of the large bowel. Absorption of the vitamin by the large bowel takes place via a passive, nonsaturable process that shows no evidence of energy dependence or carrier mediation. It is concluded that vitamin K_2 (bacterial origin) is absorbable by the rat colon in amounts sufficient to meet the daily requirement of the animal, and this may explain the lack of bleeding problems in the face of episodic lack of dietary vitamin K.

1576 FACILITATED TRANSPORT OF UREA ACROSS THE TOAD GALLBLADDER. (Eng.) Curci, S.; Casavola, V.; Cremaschi, D.; Lippe, C. (Inst. General Physiology, Univ. Bari, Via Amendola 165/A, I-70126 Bari, Italy). *Pfleugers Arch.* 362(2):109-112; 1976.

1577 THE RELEVANCE OF THE OSMOLARITY OF THE INSTILLATION FLUID TO THE EFFECTIVENESS AND TOXICITY OF DRUGS GIVEN BY THE INTRADUODENAL ROUTE--SOLVENT DRUG INFLUENCE ON THE INTESTINAL ABSORPTION OF DRUGS. (Eng.) Vogel, G.; Becker, U.; Ulbrich, M. (Dept. Pharmacology, Dr. Madaus and Co., 5 Koln-Merheim [91], Ostmerheimer Str. 198 Germany). *Arzneim. Forsch.* 25(7):1037-1039; 1975.

1578 FIBRE VS. PHYTATE AS DETERMINANT OF THE AVAILABILITY OF CALCIUM, ZINC AND IRON OF BREADSTUFFS. (Eng.) Reinhold, J. G.; Ismail-Beigi, F.; Faradji, B. (Pahlavi Univ. Coll. Medicine, Shiraz, Iran). *Nutr. Rep. Int.* 12(2):75-85; 1975.

1579 EFFECTS OF NORMAL ALCOHOLS ON INTESTINAL ABSORPTION OF SALICYLIC ACID, SULFAPYRIDINE, AND PREDNISOLONE IN RATS. (Eng.) Hayton, W. L. (Coll. Pharmacy, Washington State Univ., Pullman, WA 99163). *J. Pharm. Sci.* 64(9):1450-1456; 1975.

1580 LIGANDIN. (Eng.) Meuwissen, J. A. T. P.; Ketterer, B.; Heirwegh, K. P. M.; De Groote, J. (Departement Medische Navorsing, Rega Inst., B-3000 Leuven, Belgium). *Tijdschr. Gastroenterol.* 18(1):7-20; 1975.

1581 TRANSCAPILLARY FLUID MOVEMENTS IN SYMPATHECTOMIZED INTESTINE AND SKIN DURING HEMORRHAGIC HYPOTENSION. (Eng.) Jarhult, J.; Grande, P.-O. (Dept. Physiology and Biophysics, Univ. Lund, Sweden). *Acta Physiol. Scand.* 94(1):29-35; 1975.

1582 THE EFFECT OF FASTING ON THE RATE OF INTESTINAL DRUG ABSORPTION IN RATS: PRELIMINARY STUDIES. (Eng.) Orr, J. M.; Benet, L. Z. (Bio-Res. Lab., Ltd., Pointe Claire, Quebec, Canada H9R 1G6). *Am. J. Dig. Dis.* 20(9):858-865; 1975.

1583 THE EFFECT OF DETERGENT TREATMENT OF THE GASTRIC MUCOSA ON DRUG TRANSPORT. (Eng.) Keller, R. W.; Berenson, M. M.; Moody, F.; Freston, J. W. (Dept. Medicine, Univ. Utah, Salt Lake City, UT 84113). *Proc. Soc. Exp. Biol. Med.* 151(4):730-735; 1976.

1584 EFFECT OF METHOTREXATE ON DRUG ABSORPTION FROM THE RAT SMALL INTESTINE IN SITU AND IN VITRO. (Eng.) Venho, V. M. K. (Dept. Pharmacology, Univ. Helsinki, Siltavuorenpenger 10, SF-00170 Helsinki 17, Finland). *Acta Pharmacol. Toxicol. (Kbh)* 38(5):450-464; 1976.

1585 SUGAR-INDUCED POTENTIAL DIFFERENCE AND SHORT CIRCUIT CURRENT IN BULLFROG SMALL INTESTINE: EFFECT OF UO_2^{2+}. (Eng.) Armstrong, W. McD.; Duque Arbelaez, J. (Indiana Univ. Sch. Medicine, Indianapolis, IN 46202). *Proc. Soc. Exp. Biol. Med.* 152(1):11-15; 1976.

1586 EFFECT OF POLYSORBATE 80 ON APPARENT PARTITION COEFFICIENT OF SALICYCLIC ACID AND ITS ABSORPTION FROM THE RAT INTESTINE. (Eng.) Hikal, A. H.; Dyer, L.; Wong, S.-W. (Coll. Pharmacy, Univ. Houston, Houston, TX 77004). *J. Pharm. Sci.* 65(4):621-623; 1976.

1587 EFFECTS OF SOLID FOOD ON BLOOD LEVELS OF ALCOHOL IN MAN. (Eng.) Lin, Y.-J.; Weidler, D. J.; Garg, D. C.; Wagner, J. G. (Coll. Pharmacy, Univ. Michigan, Ann Arbor, MI 48109). *Res. Commun. Chem. Pathol. Pharmacol.* 13(4):713-722; 1976.

1588 INCREASED INTESTINAL ABSORPTION IN THE RAT CAUSED BY SODIUM LAURYL SULPHATE, AND ITS POSSIBLE RELATION TO THE cAMP SYSTEM. (Eng.) Briseid, G.; Briseid, K.; Kirkevold, K. (Dept. Pharmacology, Univ. Oslo, Blindern, Oslo 3, Norway). *Naunyn Schmiedebergs Arch. Pharmacol.* 292(2):137-144; 1976.

1589 METHYLXANTHINES AND INTESTINAL DRUG ABSORPTION. (Eng.) Beubler, E.; Lembeck, F. (Institut fur experimentelle unde klinische Pharmakologie der Universitat Graz, Universitatsplatz 4, A-8010 Graz, Austria). *Naunyn Schmiedebergs Arch. Pharmacol.* 292(1):73-77; 1976.

1590 THE EFFECT OF MUCIN ON THE BIOAVAILABILITY OF TETRACYCLINE FROM THE GASTROINTESTINAL TRACT; IN VIVO, IN VITRO CORRELATIONS. (Eng.) Braybrooks, M. P.; Barry, B. W.; Abbs, E. T. (Sch. Pharmacy, Portsmouth Polytechnic, King Henry I St., Portsmouth, PO1 2DZ U.K.). *J. Pharm. Pharmacol.* 27(7):508-515; 1975.

1591 THE POSSIBLE CONTROL OF INTESTINAL ABSORPTION BY SUBSTANCES OCCURRING IN THE GUT WALL. (Eng.) Coupar, I. M. (Dept. Physiology, Monash Univ., Clayton, Victoria 3168, Australia). *Guys Hosp. Rep.* 123(2):137-148; 1975.

See also, 1723, 1792, 1967.

MOTILITY

1592 GASTRODUODENAL MOTOR GRADIENTS IN THE DOG AFTER PYLOROPLASTY. (Eng.) Ormsbee, H. S., III; Bass, P. (Univ. Maryland Sch. Medicine, Baltimore, MD 21201). *Am. J. Physiol.* 230(2):389-397; 1976.

Circular muscle contractile activity of the antrum and duodenum and gastric emptying of a liquid test meal were investigated in four unanesthetized dogs in which the gastroduodenal junction (GDJ) was altered by Heineke-Mikulicz pyloroplasty. The motor activity in these dogs was compared with that in four controls. Five extraluminal strain gage force transducers were sewn to the serosal surface in the transverse axis of the stomach and duodenum in all dogs to record circular muscle activity. After pyloroplasty, antralization (antral-like contractions occurring in the first portion of the duodenum) was observed during the digestive state. Antralization replaced the normal periods of inhibition that separated periods of duodenal contractions during the interdigestive burst. Bethanechol (0.1 mg/kg, s.c.) and metoclopramide (2.0 mg/kg, i.v.) were capable of stimulating interdigestive contractile activity in the altered GDJ. Pentagastrin (1.0 μg/min, i.v.) produced a differential stimulation on the antrum without appreciably affecting duodenal contractile activity. Pyloroplasty also enhanced the emptying of a 300-ml citrate-fat liquid test meal. An intact hypomuscular segment between the antrum and duodenum is important for normal coordinated contractile activity between the antrum and the duodenum and for the normal gastric emptying of liquids.

1593 EFFECT OF A GASTRIN-LIKE PEPTIDE ON ELECTRICAL AND CONTRACTILE ACTIVITIES OF CANINE STOMACH. (Eng.) Akaike, N. (Kumamoto Univ. Medical Sch., Kumamoto, Japan). *Kumamoto Med. J.* 28(2):94-99; 1975.

The effect of a gastrin-like amyloxycarbonyl tetrapeptide (AOC) was investigated in the stomachs of 36 dogs by recording electrical and mechanical activities of the antrum. The "pacesetter potential," recorded with a suction electrode, consisted of a triphasic spike potential, followed by a monophasic slow potential. The slow potential amplitude was increased by AOC (0.6 μg/kg, i.v.), gastrin (0.6 μg/kg), histamine (30 μg/kg), and cholinergic drugs, while the spike potential was not affected by any drugs. However, frequency of the pacesetter potential was increased by both AOC and gastrin, but decreased by histamine and cholinergic drugs. All drugs increased antral contractions. Comparing the effects of atropine (1 mg/kg) and hexamethonium (2 mg/kg) on the electrical and mechanical responses to AOC with those to histamine and cholinergic drugs, it is concluded that AOC is more similar to cholinergic drugs than to histamine in its effect on the antrum.

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1594 EFFECTS OF 13-nle-MOTILIN ON THE ELECTRICAL AND MECHANICAL ACTIVITY OF THE ISOLATED PERFUSED CANINE STOMACH AND DUODENUM. (Eng.) Green, W. E. R.; Ruppin, H.; Wingate, D. L.; Domschke, W.; Wunsch, E.; Demling, L.; Ritchie, H. D. (London Hosp. Medical Coll., London, England). *Gut* 17(5): 362-370; 1976.

The direct actions of synthetic 13-norleucine-motilin (13-nle-motilin) on myoelectrical activity and intraluminal pressure were studied in the isolated vascular-perfused canine stomach and duodenum. Intraluminal pressure was recorded by a triple lumen water-filled nonperfused open-tip tube, connected to a recorder. Myoelectrical activity was monitored by silver-chloride electrodes sutured to five sites on the serosal surface of stomach and duodenum. Increasing doses of 13-nle-motilin (40, 80, 160, 320, and 640 ng) were administered. 13-nle-motilin increased intraluminal pressure in the pylorus and duodenum, and dose-response analysis showed the duodenum to be twice as sensitive as the pylorus to the polypeptide. Pressure changes in the antrum were small and not dose-related, but, whereas the basic electrical rhythm in the duodenum was not altered, slow wave frequency, rhythm, and propagation in the antrum were disturbed. Electronic analysis of the duodenal spike increase, which accompanied pressure rises, demonstrated correlations between increases in spikes, intraluminal pressure, and dose. These results show that the direct effect of the polypeptide on adjacent organs may explain the combination of increased motor activity, with delayed gastric emptying as a consequence of disturbance in the coordination between antrum, pylorus, and duodenum.

1595 MECHANISM OF ACTION OF PENTAGASTRIN ON THE LOWER ESOPHAGEAL SPHINCTER. (Eng.) Zwick, R.; Bowes, K. L.; Daniel, E. E.; Sarna, S. K. (Surgical Medical Res. Inst., Univ. Alberta, Edmonton, Alberta, Canada). *J. Clin. Invest.* 57(6): 1644-1651; 1976.

The effect of pentagastrin on lower esophageal sphincter (LES) pressure was studied in three unanesthetized dogs. LES pressure was monitored by an infusion manometric technique. Increasing doses of pentagastrin up to 3 µg/kg, given as an i.v. bolus, resulted in increasing rises in LES pressure; larger doses resulted in a lesser effect of shorter duration. Increasing i.v. boluses of methacholine produced greater increases in LES pressure up to a maximum of 5 µg/kg; higher doses had similar effects. Atropine (50-100 µg/kg) slightly diminished the response of the LES to 2 or 6 µg/kg of pentagastrin. In large doses (500-2,000 µg/kg), atropine did not diminish the response to pentagastrin and prolonged the response of 6 µg/kg pentagastrin. Hexamethonium (2 mg/kg, i.v.) slightly depressed the peak response to 3 µg/kg pentagastrin, but the response to 6 µg/kg was increased and prolonged. Propranolol (2 mg/kg, i.v.) significantly prolonged the effect of 6 µg/kg pentagastrin on the LES. It is concluded that the stimulatory effect of pentagastrin is mainly due to a direct action on the LES. A lesser stimulato effect is due to an action on preganglionic cholinergic neurons.

1596 GENESIS OF BASAL SPHINCTER PRESSURE: EFFECT OF TETRODOTOXIN ON LOWER ESOPHAGEA SPHINCTER PRESSURE IN OPOSSUM IN VIVO. (Eng.) Goyal, R. K.; Rattan, S. (Southwestern Medical Sch., 5323 Harry Hines Blvd., Dallas, TX 75235). *Gastroenterology* 71(1):62-67; 1976.

The role of neural and myogenic activity in the genesis of resting sphincter pressure was evaluated in the opossum. The neural activity in the sphinct was blocked by i.v. administration of the puffer fish poison, tetrodotoxin, in intact animals. Ther was considerable variation among animals regarding the dose of tetrodotoxin required to produce adequate blockage of all of the neurally stimulated responses (10-60 µg/kg). A respirator was used to assist breathing; blood pressure was supported by i.v. administration of Ringer's solution; and body temperature was maintained by a heating lamp. The lower esophageal sphincter pressures were measured with water-filled and continuously perfused catheters, which were anchored to the lower esophageal sphincter using anchoring pins. Tetrodotoxin (10 µg/kg) blocked the sphincter response to neural stimulation with vagal stimulation, esophageal distention, and local electrical stimulation of the sphincter. The mean resting sphincter pressure before tetrodotoxin was 59.0 ± 2.6 mm Hg, and it was 64.4 ± 6.9 mm Hg after tetrodotoxin ($p>0.05$). During neural block with tetrodotoxin, the sphincte response to administration of isoproterenol (2.5 µg/kg) or bethanechol (20 µg/kg) was similar to tha during the control period ($p>0.05$). Results indica that: tetrodotoxin can be administered in intact animals to achieve complete blockage of neural acti ity in the lower esophageal sphincter; sphincter muscle is not adversely affected by tetrodotoxin; and blocking neural activity does not alter the res ing lower esophageal sphincter pressure.

1597 STUDIES ON THE MECHANISM OF ESOPHAGITIS-INDUCED LOWER ESOPHAGEAL SPHINCTER HYPOTENSION IN CATS. (Eng.) Higgs, R. H.; Castell, D. O.; Eastwood, G. L. (U.S. Naval Hosp., 17th and Pattison Ave., Philadelphia, PA 19145). *Gastroenterology* 71(1):51-57; 1976.

The effects of experimental esophagitis on the lower esophageal sphincter (LES) response to edrophonium, pentagastrin, and bethanechol were studied This was based upon the findings that perfusion of 0.1 N HCL 5 cm above the LES in cats, for 30 min on 4 consecutive days produced biopsy-documented esophagitis and marked decreases in LES pressure. The sphincter response to both edrophonium (100 µg/kg, i.v.) and pentagastrin (0.6 µg/kg, i.v.), after esophagitis was induced, was significantly less tha preperfusion responses. When the esophagitis was resolved, the pressure response to edrophonium and pentagastrin returned to preperfusion levels. In contrast, the sphincter response to bethanechol (25 μg/kg, i.v.), during esophagitis, was not different from the preperfusion response and it remained unchanged after resolution of the esophagitis. Lower esophageal smooth muscle taken from cats with active esophagitis appeared normal by both light and electron microscopy. These studies indicate that besides decreasing resting LES tone, esophageal inflammation causes functional impairment of a cholinergic mechanism regulating LES pressure. In contrast, the smooth muscle appears to be unaffected by inflammation, despite the LES hypotension.

1598 THE MECHANICAL PROPERTIES OF OESOPHAGEAL STRIATED MUSCLE IN THE CAT AND SHEEP. (Eng.) Floyd, K.; Morrison, J. F. B. (Dept. Physiology, Univ. Leeds, Leeds LS2 9JT, England). *J. Physiol. (Lond.)* 248(3):717-724; 1975.

1599 PHARMACOLOGICAL STUDIES ON CHINESE CINNAMON. II. EFFECTS OF CINNAMALDEHYDE ON THE CARDIOVASCULAR AND DIGESTIVE SYSTEMS. (Eng.) Harada, M.; Yano, S. (Faculty Pharmaceutical Sciences, Univ. Chiba, Yayoi-cho, Chiba, Japan). *Chem. Parm. Bull. (Tokyo)* 23(5):941-947; 1975.

1600 EFFECTS OF 7-HYDROXY-Δ^6-TETRAHYDROCANNABINOL AND SOME RELATED CANNABINOIDS ON THE GUINEA PIG ISOLATED ILEUM. (Eng.) Rosell, S.; Agurell, S. (Karolinska Inst., Stockholm, Sweden). *Acta Physiol. Scand.* 94(1):142-144; 1975.

1601 THE EFFECTS OF PROSTAGLANDINS ON GUINEA-PIG ISOLATED INTESTINE AND THEIR POSSIBLE CONTRIBUTION TO MUSCLE ACTIVITY AND TONE. (Eng.) Bennett, A.; Eley, K. G.; Stockley, H. L. (King's Coll. Hosp. Medical Sch., London, SE5 8RX, England). *Br. J. Pharmacol.* 54(2):197-204; 1975.

1602 POSTNATAL ONTOGENETIC DEVELOPMENT OF NEUROGENIC AND MYCOGENIC CONTROL IN THE RAT PORTAL VEIN. (Eng.) Ljung, B.; Stage (McMurphy), D. (Dept. Physiology, Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 94(1):112-127; 1975.

1603 GASTRIC EMPTYING IN NEWBORNS AND YOUNG INFANTS. MEASUREMENT OF THE RATE OF EMPTYING USING INDIUM-113m-MICROCOLLOID. (Eng.) Signer, E.; Fridrich, R. (Univ. Children's Hosp., Kinderspital, Romergasse 8, CH-4005 Basel, Switzerland). *Acta Paediatr. Scand.* 64(Suppl. 3):525-530; 1975.

1604 AN EVALUATION OF EFFECT OF AIRBORNE DUST FROM A COTTON MILL ON THE GUINEA-PIG ILEUM WITH REFERENCE TO BYSSINOSIS. (Eng.) Cinkotai, F. F.; Franklin, D. W. (Dept. Occupational Health, Univ. Manchester, Oxford Road, Manchester M13 9PT, England). *Br. J. Ind. Med.* 32(3):239-243; 1975.

1605 EFFECTS OF DRUGS ON ESOPHAGEAL MOTILITY. (Eng.) Christensen, J. (Univ. Iowa Coll. Medicine, Iowa City, IA 52242). *Arch. Int. Med.* 136(5):532-537; 1976.

1606 NEUROMUSCULAR ORGANIZATION OF ESOPHAGEAL AND PHARYNGEAL MOTILITY. (Eng.) Weisbrodt, N. W. (Univ. Texas Medical Sch. Houston, PO Box 20708, Houston, TX 77030). *Arch. Int. Med.* 136(5):524-531; 1976.

1607 UNEXPECTED REVERSAL EFFECTS OF A NALOXONE ON THE GUINEA PIG ILEUM. (Eng.) Van Nueten, J. M.; Janssen, P. A. J.; Fontaine, J. (Dept. Pharmacology, Janssen Pharmaceutica, B-2340 Beerse, Belgium). *Life Sci.* 18(8):803-810; 1976.

1608 THE EFFECT OF CARBACHOL ON RESTING GASTRO-OESOPHAGEAL SPHINCTER PRESSURE AND SERUM GASTRIN IN NORMAL HUMAN SUBJECTS. (Eng.) Boesby, S.; Brandsborg, M.; Brandsborg, O.; Larsen, N. K.; Pedersen, S. A. (Odense Sygehus, Sdr. Boulevard 29, DK-5000, Odense, Denmark). *Scand. J. Gastroenterol.* 11(2):171-175; 1976.

See also, 1714, 1729, 1730, 1753, 1761.

SECRETION AND METABOLISM

1609 FORMALDEHYDE-OZONE-INDUCED FLUORESCENCE IN ISOLATED GASTRIN GRANULES. (Eng.) Larsson, L.-I.; Hakanson, R.; Ingemansson, S.; Sundler, F. (Dept. Histology, Univ. Lund, Lund, Sweden). *Histochemistry* 44(2):197-200; 1975.

1610 EFFECTS OF NERVE STIMULATION AND DENERVATION ON SECRETORY MATERIAL IN SUBMANDIBULAR STRIATED DUCT CELLS OF CATS, AND THE POSSIBLE ROLE OF THESE CELLS IN THE SECRETION OF SALIVARY KALLIKREIN. (Eng.) Garrett, J. R.; Kidd, A. (Dept.

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Oral Pathol., King's Coll. Hosp. Dental Sch., Denmark Hill, London SE5 8RX, England). *Cell Tissue Res.* 161(1):71-84; 1975.

1611 MICROSOMAL O-DEMETHYLATION, N-DEMETHYLATION AND AROMATIC HYDROXYLATION IN THE PRESENCE OF BISULFITE AND DITHIOTHREITOL. (Eng.) Smith, R. V.; Erhardt, P. W.; Leslie, S. W. (Coll. Pharmacy, Univ. Texas, Austin, TX 78712). *Res. Commun. Chem. Pathol. Pharmacol.* 12(1):181-184; 1975.

1612 INFLUENCE OF DRY MATTER AND NITROGEN INTAKES ON FECAL NITROGEN LOSSES IN CATTLE. (Eng.) Stallcup, O. T.; Davis, G. V.; Shields, L. (Dept. Animal Sci., Univ. Arkansas, Fayetteville, AR 72701). *J. Dairy Res.* 68(9):1301-1307; 1975.

1613 DISPERSED RAT PAROTID ACINAR CELLS. I. MORPHOLOGICAL AND FUNCTIONAL CHARACTERIZATION. (Eng.) Mangos, J. A.; McSherry, N. R.; Butcher, F.; Irwin, K.; Barber, T. (Univ. Wisconsin Medical Sch., Madison, WI 53706). *Am. J. Physiol.* 229(3):553-559; 1975.

1614 DISPERSED RAT PAROTID ACINAR CELLS. II. CHARACTERIZATION OF ADRENERGIC RECEPTORS. (Eng.) Mangos, J. A.; McSherry, N. R.; Barber, T.; Arvanitakis, S. N.; Wagner, V. (Univ. Wisconsin Medical Sch., Madison, WI 53706). *Am. J. Physiol.* 229(3):560-565; 1975.

1615 DISPERSED RAT PAROTID ACINAR CELLS. III. CHARACTERIZATION OF CHOLINERGIC RECEPTORS (Eng.) Mangos, J. A.; McSherry, N. R.; Barber, T. (Univ. Wisconsin Medical Sch., Madison, WI 53706). *Am. J. Physiol.* 229(3):566-569; 1975.

1616 AUTONOMIC NERVE STIMULATION, KALLIKREIN CONTENT AND ACINAR CELL GRANULES OF THE CAT'S SUBMANDIBULAR GLAND. (Eng.) Barton, S.; Sanders, E. J.; Schachter, M.; Uddin, M. (Dept. Physiology, Univ. Alberta, Edmonton, Alberta, Canad *J. Physiol.* 251(2):363-369; 1975.

See also, 1618, 1623, 1628, 1718, 1724, 2255.

SECRETION AND METABOLISM

Stomach

1617 SEX-RELATED DIFFERENCE IN ANTRAL AND SERUM GASTRIN LEVELS IN THE RAT. (Eng.) Lichtenberger, L. M.; Nance, D. M.; Gorski, R. A. (Veterans Admin. Wadsworth Hosp. Center, Building 115, Room 115, Los Angeles, CA 90073). *Proc. Soc. Exp. Biol. Med.* 151(4):785-788; 1976.

Antral and serum gastrin levels were measured by radioimmunoassay in normal male and female Sprague-Dawley rats, in ovariectomized rats with and without estrogen treatment, and in mother rats during their third week of lactation. Males had a significantly higher serum gastrin concentration than did female rats; however, this level was significantly increased to male levels following ovariectomy. Daily treatment with 2 μg of estradiol benzoate for 14 days decreased the serum gastrin concentration in ovariectomized rats to the levels in normal females. Following ovariectomy, antral gastrin levels also increased, but not significantly. Both antral and serum concentrations were significantly higher in lactating rats than in any other group ($p<0.01$). The results indicate that there are reliable sex differences in antral and serum gastrin concentrations and that the low serum gastrin levels in intact normal females may be due to an inhibitory action of ovarian estrogen. Sex-dependent alterations of food consumption may cause the disparity between gastrin levels as male rats consumed a significantly greater amount of food over a 5-day analysis.

1618 RE-EVALUATION OF THE ROLE OF CYCLIC AMP IN HISTAMINE-INDUCED GASTRIC ACID SECRETION. (Eng.) Rosenfeld, G. C.; Jacobson, E. D.; Thompson, W. J. (Univ. Texas Medical Sch. Houston, Houston, TX 77025). *Gastroenterology* 70(5):832-835; 1976.

The relation between putative histamine H_2 receptors and gastric mucosal adenylyl cyclase and cyclic AMP phosphodiesterase was investigated in female Sprague Dawley rats. The 600 x *g* particulate fraction of gastric mucosal scrapings was incubated with ^3H-metiamide, which saturated available binding sites at a concentration of 1 μM. Scatchard plots showed a single component with a Kd value of 0.2 μM. Unlabeled cimetidine and histamine competed with ^3H-metiamide binding. The 600 x *g* particulate fractio also contained all of the hormone and sodium fluori sensitive adenylyl cyclase. Adenylyl cyclase activity was not altered by histamine, pentagastrin, or carbachol, each tested by wide concentration ranges (0.1-20 mM), but it was increased during incubation with prostaglandin E_1, secretin, and epinephrine. These findings do not support the hypothesis that gastric secretion is mediated by intracellular accumulation of cyclic AMP.

1619 ACTION OF H_1 AND H_2 INHIBITORS ON THE RESPONSE OF HISTAMINE SENSITIVE ADENYLYL

CYCLASE FROM GUINEA-PIG MUCOSA. (Eng.) Perrier, C. V.; Griessen, M. (Dept. Medicine, Univ. Geneva, Switzerland). *Eur. J. Clin. Invest.* 6(1):113-120; 1976.

The kinetics of burimamide, an H_2-inhibitor, and mepyramine and chlorpheniramine, both H_1-inhibitors, were studied in the adenylyl cyclase system. Adenylyl cyclase activity was assessed in homogenates of guinea pig fundic mucosa. The histamine content of this tissue was determined by a spectrofluorimetric method. Both H_1 and H_2 inhibitors behaved kinetically as competitive inhibitors of histamine, but the K_m derived for burimamide ($2.5\text{-}4.1 \times 10^{-5}$) was significantly lower than that for either chlorpheniramine ($0.9\text{-}1.9 \times 10^{-4}$) or mepyramine ($1.3\text{-}1.4 \times 10^{-4}$). However, none of the three inhibitors influenced the cyclase activation by prostaglandins 1 and 2. These results suggest that there are at least two types of receptors in the preparation studied, one responsive to histamine and the other to the prostaglandins. The specificity of H_1- and H_2-receptors is not absolute in the broken cell preparation.

1620 EXCITATION OF ACID AND PEPSIN SECRETION BY CHOLECYSTOKININ-PANCREOZYMIN IN PAVLOV AND HEIDENHAIN POUCHES OF THE RAT.

(Eng.) Lundell, L. (Inst. Physiology, Univ. Lund, Solvegatan 19, S-223 62 Lund, Sweden). *Experientia* 31(7):823-824; 1975.

The role of the vagus nerve for the sensitivity of the acid and pepsin secreting cells to cholecystokinin-pancreozymin (CCK-PZ) stimulation was studied in female Sprague-Dawley rats with Heidenhain or Pavlov pouches. CCK-PZ was infused i.v. for 90 min, and acid and pepsin outputs were measured. In the Heidenhain pouches, interdigestive acid secretion was 1.5 μEq/30 min and in the Pavlov pouches, it was 38.8 μEq/30 min. When CCK-PZ was infused in doses that caused maximal responses, the acid secretion rose to 71.7 μEq/30 min in the Heidenhain pouches and to 95.0 μE/30 min in the Pavlov pouches. The Pavlov pouch was more sensitive to CCK-PZ. Supramaximal doses of CCK-PZ caused a decrease in the secretory rate. Secretion with 2 μg/kg CCK-PZ was 63.8 μEq/30 min in the Pavlov pouches and 43.4 μEq/30 min in the Heidenhain pouches with 4 μg/hr of CCK-PZ. The interdigestive pepsin secretion was 115 μg/30 min in the Heidenhain pouches and 365 μg/30 min in the Pavlov pouches. CCK-PZ caused an increase to 347 μg/30 min with 0.25 μg/hr in the Heidenhain pouches and to 531 μg/30 min with 0.5 μg/hr in the Pavlov pouches. The results show that CCK-PZ is an effective stimulant of acid secretion in both types of rat pouches and that the vagus nerve facilitates the acid stimulatory potency of the drug.

1621 SECRETION OF HYDROCHLORIC ACID IN GHOSH-LAI RAT PREPARATION FOLLOWING STIMULATION WITH HISTAMINE AND PENTAGASTRIN AND INHIBITION BY GASTRONE AND ATROPINE.

(Eng.) Balanzo, J. T.; Glass, G. B. J. (New York Medical Coll., New York, NY 10029). *Digestion* 13(5):291-303; 1975.

The stimulatory effects of histamine and pentagastrin, and the inhibitory effects of gastrone and atropine, on the secretory output of HCl in Ghosh-Lai stomach preparation were quantitated in 48 successfully operated rats. The usefulness of this rat preparation was well demonstrated and good duplication of results was obtained with various doses of histamine and pentagastrin. The HCl output following an optimal i.v. pentagastrin dose of 6 μg/kg/30 min was almost twice that after an optimal i.v. histamine dose of 0.2 mg/kg/30 min. The inhibitory effect of gastrone B on histamine-stimulated HCl output was confirmed and was shown to extend also on the pentagastrin-stimulated HCl secretion. The comparison of the atropine and gastrone inhibition of the pentagastrin-stimulated HCl output in the Ghosh-Lai rat stomach preparation indicates that the inhibitory effect of 0.1 mg/kg atropine i.v. is less than that of 40 μg gastrone i.v., and that the effects of 0.4 mg/kg atropine i.v. are similar or slightly less than 50 μg gastrone i.v. The results demonstrate good applicability of this preparation to the quantification of acid secretion in the rat under basal conditions, after histamine or pentagastrin stimulation, and after the inhibition by gastrone and atropine.

1622 EFFECT OF METIAMIDE, A HISTAMINE H2-RECEPTOR ANTAGONIST, ON THE DEVELOPMENT OF GASTRIC STRESS ULCERS AND ACID SECRETION.

(Eng.) Bugajski, J.; Hano, J.; Danek, L. (Inst. Pharmacology, Polish Acad. Sciences, Krakow, Poland). *Eur. J. Pharmacol.* 36(1):237-240; 1976.

The effect of metiamide (0.0005-100 μM/kg), a histamine H2-receptor antagonist, on the development of gastric stress ulcers and acid secretion was investigated in Wistar rats. In normal and stressed rats with chronic gastric fistula, small doses (0.001-0.01 μM/kg) increased, and doses of over 20 μM/kg decreased, gastric acid secretion. In both of these dosage ranges, metiamide suppressed the development of stress ulcers, most markedly in doses of 0.005 and 100 μM/kg. Intermediate doses had no such action. Only the anti-ulcer action of large doses of metiamide paralleled a reduction in acid secretion. In normal and in stressed rats, neither of the anti-ulcer doses of metiamide (0.005 and 100 μM/kg) changed the level of biogenic amines in the brain. In the gastric wall, however, both doses of metiamide prevented a stress-induced fall of the noradrenaline (NA). In normal rats, metiamide consistently evoked a slight rise in the blood glucose level. During stress, doses greater than 0.001 μM/kg always reduced the observed hypoglycemia. The results indicate that histamine plays an essential role in the pathogenesis of stress ulcers, most probably as a mediator of the stimulation of gastric acid secretion. Metiamide, besides blocking the histamine H_2-receptor, also exhibits a weak adrenergic action.

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1623 GASTRIC MUCOSAL BLOOD FLOW AND PEPSIN SECRETION IN DOGS--STIMULATION BY 13-Nle-MOTILIN.

(Eng.) Koch, H.; Domschke, S.; Belohlavek, D.; Domschke, W.; Wunsch, E.; Jaeger, E.; Demling, L. (Dept. Medicine, Univ. Erlangen-Nurnberg, D-852 Erlangen, Krankenhausstrasse 12, Munich, W. Germany). *Scand. J. Gastroenterol.* 11(1):93-96; 1976.

Gastric mucosal blood flow (GMBF) in response to graded doses of i.v. 13-norleucine-motilin (13-motilin) was studied in canine vagally denervated fundic pouches, using the aminopyrine clearance technique. As 13-nle-motilin did not exert any detectable effect on gastric secretion of hydrogen ions, intraluminal instillation of 160 mM HCl was used to provide a pH gradient allowing aminopyrine to move into the pouch lumen. With increasing doses of 13-nle-motilin, GMBF increased to 148% of control values; pepsin secretion, due to augmented pepsin concentration, rose concomitantly. Enhanced pepsin secretion was not accompanied by an increase in cyclic AMP secretion. These results indicate that aminopyrine clearance is increased by 13-nle-motilin, whereas H^+ secretion remains entirely unchanged. These data are consistent with reports demonstrating that primary changes in GMBF can be induced without affecting acid secretion, thus ruling out a strict causal relation between both parameters.

1624 INHIBITION OF STIMULATED GASTRIC SECRETION BY AN ORALLY ADMINISTERED PROSTAGLANDIN CAPSULE: A STUDY IN NORMAL MEN.

(Eng.) Wilson, D. E.; Quertermus, J.; Raiser, M.; Curran, J.; Robert, A. (840 South Wood St., Chicago, IL 60612). *Ann. Intern. Med.* 84(6):688-691; 1976.

The effect of ingestion of a gelatin capsule containing 127 μg of 16,16-dimethyl prostaglandin E_2 (DM-prostaglandin E_2) or a liquid containing 127 μg of DM-prostaglandin E_2 on stimulated gastric secretion was studied in 10 normal men. Forty-five min after the drug was administered, basal gastric secretion was collected. Submaximal gastric secretion was achieved by administering histamine acid phosphate (15 g/kg/hr, i.v.). Gastric secretion was collected by constant suction for 2 hr after the start of histamine infusion. Serum gastrin was measured just before ingestion of prostaglandin and 45 and 75 min after. DM-prostaglandin E_2 significantly reduced the volume, acid concentration, and total acid output of gastric secretion. Secretory inhibition during the 3 hr after treatment with the capsule was 37% (volume), 39% (acid concentration), and 60% (acid output). The DM-prostaglandin E_2 capsule was nearly as effective as an equivalent amount of DM-prostaglandin E_2 in solution. Prostaglandin analogues because of their oral effectiveness and duration of action may have therapeutic value in peptic ulcer disease.

1625 ON THE METABOLISM OF PROSTAGLANDINS BY HUMAN GASTRIC FUNDUS MUCOSA.

(Eng.) Peskar, B. M.; Peskar, B. A. (Medizinische Klinik, Univ. Freiburg, D-78 Freiburg i.Br., W. Germany). *Biochim. Biophys. Acta* 424(3):430-438; 1976.

Specific radioimmunoassays for the prostaglandins E_2, $F_{2\alpha}$, and A_2 and the metabolites 13,14-dihydro-15-keto-prostaglandin E_2, 15-keto-prostaglandin $F_{2\alpha}$, and 13,14-dihydro-15-keto-prostaglandin $F_{2\alpha}$ were used to study the metabolism of prostaglandins by gastroscopically obtained small biopsy specimens of human gastric fundus mucosa from 21 patients. Three prostaglandin-metabolizing enzymes were found in the 100,000 x *g* supernatant of human gastric fundus mucosa: 15-hydroxy-prostaglandin-dehydrogenase, Δ^{13}-reductase, and Δ^9-reductase. The specific activity was highest for 15-hydroxy-prostaglandin dehydrogenase and lowest for Δ^9-reductase. Formation of prostaglandin A_2 (or B_2) was not observed under the same conditions. None of the three enzyme activities detected in the 100,000 x *g* supernatant was found in the 10,000 x *g* and 100,000 x *g* pellets of human gastric fundus mucosa. The results indicate that high-speed supernatant derived from human gastric mucosa can rapidly metabolize prostaglandin E_2 and prostaglandin $F_{2\alpha}$ to the 15-keto and 13,14-dihydro-15-keto-derivatives. Furthermore, prostaglandin E_2 can be converted to prostaglandin $F_{2\alpha}$. The biological activity of prostaglandin $F_{2\alpha}$, on gastric functions, differs from that of prostaglandin E_2.

1626 INTERACTION OF PROSTAGLANDINS AND HISTAMINE WITH ENZYMES OF CYCLIC AMP METABOLISM FROM GUINEA PIG GASTRIC MUCOSA.

(Eng.) Wollin, A.; Code, C. F.; Dousa, T. P. (Mayo Clinic Foundation, Rochester, MN 55901). *J. Clin. Invest.* 57(6):1548-1553; 1976.

The effects of both prostaglandins (PGE_1, PGE_2, and PGA_1) and histamine were tested on the enzymes of cyclic AMP metabolism of the fundic and the antral gastric mucosa of the guinea pig. Both prostaglandins and histamine stimulated adenylate cyclase activity in cell-free membrane preparations of guinea pig gastric fundic mucosa. The stimulator effect of prostaglandins was specific and dose-dependent over a concentration range from 10^{-7} to 10^{-4} M. In similar preparations from antral regions of guinea pig gastric mucosa, the adenylate cyclase was stimulated only by PGE_1, PGE_2, and PGA_1 and not by histamine. Maximum stimulating doses of PGE_1, PGE_2, or PGA_1 (all 10^{-4} M), and of histamine (10^{-4} M) had an additive effect on the adenylate cyclase activity from fundic gastric mucosa. Metiamide (10^{-4} M) inhibited the stimulation of fundic mucosa adenylate cyclase by histamine but did not interfere with the stimulation by prostaglandins. Cyclic AMP phosphodiesterase activity of guinea pig gastric mucosa was unaffected by PGE_1 and PGE_2 or by histamine, and was slightly depressed by PGA_1. These results indicate that histamine and prostaglandins stimulate two different adenylate cyclase systems, both present in guinea pig gastric mucosa tissue. Therefore, the known inhibitory effect of prostaglandins on gastric acid secretion is not related to the interference with the stimulation of the histamine H_2-receptor-sensitive adenylate cyclase complex by histamine, nor do prostaglandins accelerate cyclic AMP breakdown by cyclic AMP phosphodiesterase to reduce cyclic AMP levels.

1627 **INHIBITION OF GASTRIC SECRETION IN THE DOG BY 16,16-DIMETHYL PROSTAGLANDIN E_2.** (Eng.) Mihas, A. A.; Gibson, R. G.; Hirschowitz, B. I. (Div. Gastroenterology, Univ. Alabama, Birmingham, AL 35294). *Am. J. Physiol.* 230(2):351-356; 1976.

The action of a synthetic derivative of prostaglandin E_2, 16,16-dimethyl prostaglandin E_2 methyl ester (16,16-dimethyl PGE_2 methyl ester), was investigated in four dogs. The synthetic prostaglandin given by i.v. infusion (0.4 μg/kg/hr) inhibited gastric secretion of H^+, K^+, Cl^-, and pepsin in the four fistula dogs stimulated by histamine (H, 2-100 μg/kg/hr), pentagastrin (P, 0.1-5 μg/kg/hr), urecholine (U, 20-160 μg/kg/hr), and 2-deoxy-D-glucose (2-DG, 100 mg/kg, 10 min). During steady infusions of near-maximal doses of H, P, and U, PG-E_2 caused 75% inhibition of H^+ maximally at 90 min and over 85% inhibition of pepsin secretion maximally at 45 min. Recovery of secretion occurred 1-2 hr after infusion of PGE_2 was stopped. Injection of KCl, 1 mEq/kg, during inhibition of histamine by PGE_2 gave only a 15-min transient reversal of inhibition. When PGE_2 was given as background to 45-min step-dose responses, 0.1 μg/kg competitively inhibited histamine stimulation and 0.4 μg/kg/hr gave 100% inhibition. Against pentagastrin, 0.1 μg PGE_2/kg/hr had no effect and 0.4 μg caused uncompetitive inhibition; against urecholine, 0.4 μg PGE_2/kg/hr caused competitive inhibition of H^+ secretion. Pepsin was more markedly inhibited in each case. There were no side effects at either dose of PGE_2, which is a potent inhibitor of gastric secretion with all forms of stimuli.

1628 **THE INTERACTION OF SECRETIN AND STIMULANTS OF GASTRIC ACID SECRETION IN ANAESTHETIZED CATS.** (Eng.) Braganza, J. M.; Gibbs, A. C. C.; Howat, H. T. (Manchester Royal Infirmary, Manchester M13 9WL, England). *J. Physiol. (London)* 258(1):73-81; 1976.

Acid secretion in response to cerulein (2.5-20 ng/kg/min), desulfated cerulein (20-100 ng/kg/min), histamine (375-1,500 ng/kg/min), and N-methyl histamine (375-3,000 ng/kg/min), given alone or combined with Boots secretin 4 C.H.R. U/kg/hr, was studied in fasting anesthetized cats in which the pylorus and common bile duct were occluded. Eight separate estimates of the calculated maximal response of acid (four acid stimulants given with and without secretin) did not differ significantly from one another. In the presence of secretin, the ED_{50} of each acid stimulant was decreased. Outputs of acid in response to the smallest doses of desulfated cerulein, histamine, and N-methyl histamine increased significantly when secretin was infused ($p<0.5$). On a weight basis, cerulein was 23, 474, and 95 times more potent than desulfated cerulein, histamine, and N-methyl histamine, resp. When secretin was infused simultaneously, cerulein was 8, 171, and 165 times more potent than desulfated cerulein, histamine, and N-methyl histamine, resp. N-methyl histamine was 5.6 times more potent than histamine on a weight basis when infused alone; it was 1·16 times more potent than histamine when given in the presence of secretin. Boots secretin enhanced the acid response to the four acid stimulants. The authors suggest that Boots secretin contains an additional peptic stimulant other than secretin itself that contributes significantly to the pepsin stimulating activity of the preparation in cats.

1629 **COMPARISON OF VASOACTIVE INTESTINAL PEPTIDE (VIP) AND SECRETIN IN GASTRIC SECRETION AND MUCOSAL BLOOD FLOW.** (Eng.) Konturek, S. J.; Dembinski, A.; Thor, P.; Krol, R. (Inst. Physiology, 31-531 Krakow, ul. Grzegorzecka 16, Poland). *Pfluegers Arch.* 361(2):175-181; 1976.

The effects of vasoactive intestinal peptide (VIP) and secretin on gastric acid and pepsin secretion induced by pentagastrin, histamine, or a peptone meal, as well as the effects on gastric mucosal blood flow and meal-induced serum gastrin level, were compared in three conscious dogs, which were provided with gastric fistulas and denervated fundic pouches. Both VIP and secretin caused a dose-related stimulation of basal pepsin outputs and inhibition of pentagastrin-induced acid secretion. A dose of 8 μg/kg VIP or 1 U/kg secretin caused about 50% inhibition of pentagastrin-induced half-maximal acid output. VIP (8 μg/kg/hr), like secretin (1 U/kg/hr), inhibited pentagastrin (2 μg/kg-hr) and meal-induced gastric acid secretion, but in contrast to secretin, it caused inhibition of acid response to histamine (80 μg/kg/hr). Inhibition of acid secretion by VIP or secretin was accompanied by secondary reduction in gastric mucosal blood flow in tests with pentagastrin or histamine and by depression of the serum gastrin level in tests with a 10% peptone meal. This study indicates that in comparison with secretin, VIP has a wider spectrum of inhibition of stimulated gastric secretion and it may be considered as one of the enterogastrones released in the small intestine.

1630 **THE ROLE OF THE STOMACH IN NUTRITION.** (Eng.) Skala, I.; Masek, J. (IKEM Centrum Vykumu Metabolismu a Vyzivy, Budejovicka 800, Praha 4, Czechoslovakia). *Bibl. Nutr. Dieta* (22):17-27; 1975.

1631 **EFFECT OF 1,2-PROPANEDIOL ON THE RUMEN MUCOSAL GROWTH OF KIDS.** (Eng.) Hamada, T. (Dept. Nutrition, National Inst. Animal Industry, Chiba-shi, 280, Japan). *J. Dairy Sci.* 58(9):1352-1359; 1975.

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1632 THE GASTRIC MUCOSAL BARRIER. PAST, PRESENT, AND FUTURE. (Eng.) Davenport, H. W. (Dept. Physiology, Univ. Michigan, Ann Arbor, MI). *Mayo Clin. Proc.* 50(9):507-514; 1975.

1633 IRON AND IRON-BINDING CAPACITY OF GASTRIC JUICE. (Eng.) Hankiewicz, J.; Antes, B. (Medical Acad., Katowice, Poland). *Mater. Med. Pol.* 7(2):102-105; 1975.

1634 GASTRIN (FIRST OF TWO PARTS). (Eng.) Walsh, J. H.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Bldg. 115, Room 115, Los Angeles, CA 90073). *N. Engl. J. Med.* 292(25): 1324-1334; 1975.

1635 DEMONSTRATION OF A-CELLS AND GLUCAGON IN THE CANINE STOMACH [Abstract]. Rufener, C.; Baetens, D.; Munoz, L.; Srikant, C.; Dobbs, R.; Unger, R.; Orci, L. (Inst. Histologie and Embryologie, Ecole Medicine, CH-1211 Geneve 4 et VAH, Switzerland). *Experientia* 31(6):736; 1975.

1636 TECHNETIUM 99m SECRETION INTO THE NORMAL HUMAN STOMACH AND ITS RELATIONSHIP TO BETAZOLE-STIMULATED GASTRIC ACID. (Eng.) Hiller, G. I.; Chen, S.; Ramasamy, A. (Providence Hosp., Southfield, MI). *Bull. Sinai Hosp. Detroit* 23(2): 69-71; 1975.

1637 THE EFFECT OF SECRETIN ON PENTAGASTRIN-STIMULATED SECRETION OF GASTRIC PEPSIN AND ACID IN RATS. (Eng.) Kowalewski, K. (Surgical-Medical Res. Inst., Univ. Alberta, Edmonton, Alberta, Canada). *Arch. Int. Physiol. Biochim.* 83(2):255-259; 1975.

1638 A COMPARATIVE STUDY ON THE MECHANISM OF ACTION OF MORPHINE ON GASTRIC ACID SECRETION IN DOGS. (Eng.) Yamaguchi, I. (Fujisawa Pharmaceutical Co., Ltd., Yodogawa-ku, Osaka, Japan). *Jpn. J. Pharmacol.* 24(5):779-786; 1974.

1639 MOLECULAR FORMS OF GASTRIN IN ANTRAL MUCOSA AND SERUM OF DOGS. (Eng.) Dockray, G. J.; Debas, H. T.; Walsh, J. H.; Grossman, M. I. (Veterans Admin. Hosp. Center, Los Angeles, CA 90073). *Proc. Soc. Exp. Biol. Med.* 149(2):550-553; 1975.

1640 VOLATILE FATTY ACID METABOLISM BY RUMEN MUCOSA FROM CATTLE FED HAY OR GRAIN. (Eng. Weigand, E.; Young, J. W.; McGilliard, A. D. (Inst. Animal Nutrition, Technical Univ. Munich, D 8050 Freising-Weihenstephan, W. Germany). *J. Dairy Sci.* 58(9):1294-1300; 1975.

See also, 1553, 1562, 1568, 1592, 1641, 1740, 1751, 1753, 1854, 1887, 1893, 1908, 2253.

SECRETION AND METABOLISM

Pancreas

1641 THE EFFECT OF CHRONIC INTRAGASTRIC ALCOHOL INGESTION ON THE PANCREATIC SECRETION OF THE RAT. (Eng.) Huttunen, R.; Huttunen, P.; Jalovaara, P. (Univ. Central Hosp. Oulu, 90220 Oulu 22, Finland). *Scand. J. Gastroenterol.* 11(1):103-106; 1976.

The effect of chronic intragastric ethanol ingestion on pancreatic secretion was studied in Long Evans rats. The rats received 20% alcohol (1 ml/ 0.1 kg) by gastric intubation 5 times weekly, and the total duration of ingestion was 10-12 weeks. Pancreatic juice was collected by cannulating the pancreatic duct under ether anesthesia; basal secretion was collected during 15 min after which a further 15-min secretion was stimulated with pancreozymin (0.15 U). The volume and the content of proteins, proteolytic enzymes, and trypsin inhibitors were studied. The secretion of proteins decreased significantly, while the amount of active proteolytic enzymes was increased in the pancreatic secretion of the rats given alcohol. No active trypsin was noted in either group. The amount of trypsin inhibitors decreased in the pancreatic juice of the rats given alcohol compared with that of the control rats, but the decrease was relative to the decrease in the secretion of total proteins. No significant differences were noted in the volume of the secreted pancreatic juice between the experimental rats and the control rats. Pancreozymin increased the secretion about twofold, and the response to pancreozymin was similar in the two groups. Thus, the results demonstrate that chronic alcoholic ingestion affects pancreatic secretion of rats.

1642 PREMATURE INDUCTION OF AMYLASE IN PANCREAS AND PAROTID GLAND OF GROWING RATS BY DEXAMETHASONE. (Eng.) Sasaki, R.; Mura, M.; Takeuchi, T. Furihata, C.; Matsushima, T.; Sugimura, T. (Inst. Medical Science, Univ. Tokyo, Minato-Ku, Tokyo 108, Japan). *Biochim. Biophys. Acta* 428(3):619-626; 1976.

Studies were made on changes in the contents of α-amylase in the pancreas and parotid gland of Wistar-Imamichi rats during postnatal development. In addition, premature induction of this enzyme by hormones, and the existence of specific glucocorticoid receptors in these tissues were also studied. Amylase activity was determined by the blue-starch method in supernatants of tissue homogenates centrifuged at 20,000 x *g*. Specific glucocorticoid receptors were measured by the binding of the synthetic glucocorticoid dexamethasone to the soluble fractions of pancreas and parotid gland. The amylase content in the pancreas increased from the 9th day after birth and reached the adult level on the 28th day; its content in the parotid gland increased rapidly from the 16th to 28th day after birth and then rose more gradually to the adult level. Injection of dexamethasone (0.1 or 1 mg/kg, s.c.) into rats, 6-8 days after birth induced an increase in the amylase of the pancreas but not that of the parotid gland. However, injection of dexamethasone into weanling rats 21-23 days after birth resulted in precocious induction of amylase in both tissues. Specific glucocorticoid receptors were detectable in the parotid gland of rats from 6 days after birth, but they were almost undetectable in the pancreas until adolescence. These results indicate that the response to dexamethasone is not correlated with the level of specific glucocorticoid receptors.

1643 EFFECTS OF SOMATOSTATIN ON EXOCRINE AND ENDOCRINE PANCREATIC FUNCTION STIMULATED BY INTESTINAL HORMONES IN MAN. (Eng.) Dollinger, H. C.; Raptis, S.; Pfeiffer, E. F. (Zentrum f. Innere Medizin und Kinderheilkunde, Universitat Ulm, D-79 Ulm/Do., Steinhovelstr., 9, Germany). *Horm. Metab. Res.* 8(1):74-78; 1976.

To evaluate the action of somatostatin on exocrine and endocrine pancreatic function, a 300 μg bolus of synthetic somatostatin (GIF) was administered i.v. to 17 normal subjects. This was followed by a constant 60-min infusion (5 μg/min). Secretin-induced (0.25 U/kg/hr) volume and total bicarbonate contents of the duodenal aspirate were not affected by GIF, whereas the bicarbonate concentration was significantly diminished. GIF reduced the pancreatic enzyme secretion stimulated by pure (99%) cholecystokinin-pancreozymin. After the GIF infusion was stopped, a significant rise in enzyme secretion was observed. The secretin-induced insulin release was almost completely suppressed. Because GIF can be extracted in large quantities from pancreas, these data suggest that somatostatin may play a physiological role in the regulation of the secretory processes of this organ. Furthermore, the ability of GIF to inhibit circulating plasma gastrin and gastric secretion as well as to reduce requirements for exogenous insulin makes it a potentially useful adjunct in the treatment of acute pancreatitis.

1644 EXTERNAL PANCREATIC SECRETION AFTER BOMBESIN INFUSION IN MAN. (Eng.) Basso, N.; Giri, S.; Improta, G.; Lezoche, E.; Melchiorri, P.; Percoco, M.; Speranza, V. (Istituto III Patologia Chirurgica, Policlinico Umberto I. Universita di Roma, Rome, Italy). *Gut* 16(12):994-998; 1975.

The effect of bombesin on external pancreatic secretion was studied in seven healthy volunteers and in two patients with a two-thirds gastrectomy and a pancreatic fistula. After an i.v. 90-min infusion of bombesin (15 ng/kg/min), gastrin levels were significantly raised in all volunteers, but they remained at basal levels in the gastrectomized patients. Bombesin stimulated pancreatic secretion in all patients. The volume of secretion increased twofold when compared with basal volume. Amylase and trypsin concentrations and outputs in the duodenal juice were greatly augmented (basal amylase concentration, 70 dye U/ml; post-bombesin, 620 dye U/ml; basal amylase output, 1,000 dye U/15 min; post-bombesin, 15,800 dye U/15 min). When administered in conjunction with bombesin, secretin (1.7 U/kg/hr) partially inhibited its secretory effect. Bicarbonate secretion was slightly stimulated by bombesin, but at a very low level. A similar pattern of results was obtained in the two gastrectomized patients. This study confirms that bombesin greatly stimulates gastric secretion and exerts an effect on pancreatic secretion that mimics the effect of cholecystokinin-pancreozymin (CCK-PZ); the latter may be related to a direct CCK-PZ-like effect of bombesin on the pancreas or to the release of CCK-PZ from the duodenum due to the bombesin. Gastrin release does not play a fundamental role in this phenomenon.

1645 HYPEROSMOLARITY, CALCIUM MOVEMENTS AND ENZYME SECRETION IN RAT PANCREAS. (Eng.) Argent, B. E.; Case, R. M.; Smith, R. K. (Univ. Medical Sch., Newcastle upon Tyne, NE1 7RU, England). *J. Physiol.* 252(2):76p-78p; 1975.

1646 INFLUENCE OF VAGOTOMY ON THE CIRCADIAN RHYTHM OF THE EXOCRINE SECRETION OF THE PANCREAS IN THE RAT. (Ita.) Pedrazzoli, S.; Varotto, M.; Dodi, G.; Militello, C.; Lise, M. (Istituto di Clinica Chirurgica Generale, Univ. di Padova, Italy). *Chir. Patol. Sper.* 23(1):1-8; 1975.

1647 SYNTHESIS AND INTRACELLULAR TRANSPORT OF PROTEINS IN THE EXOCRINE PANCREAS OF THE FROG (Rana esculenta). II. AN IN VITRO STUDY OF THE TRANSPORT PROCESS AND THE INFLUENCE OF TEMPERATURE. (Eng.) Slot, J. W.; Geuze, J. J.; Poorte, C. (Centre

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Electron Microscopy, State Univ., Nicolaas Beetsstraat 22, Utrecht, Netherlands). *Cell Tissue Res.* 167(2):147-165; 1976.

1648 HYDRO-PROTEOLYTIC ACTIVITY IN RAT'S PANCREAS AFTER IRRADIATION. (Eng.) Kocmierska-Grodzka, D.; Radwan, J. (Dept. Pharmacology, Medical Sch., Bialystok, Poland). *Strahlentherapie* 150(1):80-86; 1975.

1649 STIMULATION AND INHIBITION OF PANCREATIC PHOSPHOLIPASE A_2 BY LOCAL ANESTHETICS AS A RESULT OF THEIR INTERACTION WITH THE SUBSTRATE. (Eng.) Scherphof, G.; Westenberg, H. (Lab. Physiological Chemistry, State Univ. Groningen, Bloemsingel 10, Groningen, Netherlands). *Biochim. Biophys. Acta* 398(3):442-451; 1975.

1650 INTERACTION OF PANCREATIC COLIPASE WITH A BILE SALT MICELLE. (Eng.) Charles, M.; Sari, H.; Entressangles, B.; Desnuelle, P. (Centre de Biochimie et de Biologie Moleculaire du C.N.R.S., 31, Chem Joseph-Aiguier 13274 Marseille CEDEX 2, France). *Biochem. Biophys. Res. Commun.* 65(2):740-745; 1975.

SECRETION AND METABOLISM

Hepatobiliary Tract

1651 EXPIRATORY MEASUREMENT OF MAXIMAL AMINOPYRINE DEMETHYLATION IN VIVO: EFFECT OF PHENOBARBITAL, PARTIAL HEPATECTOMY, PORTACAVAL SHUNT AND BILE DUCT LIGATION IN THE RAT. (Eng.) Lauterburg., B. H.; Bircher, J. (Mayo Graduate Sch. Medicine, Rochester, MN). *J. Pharmacol. Exp. Ther.* 196 (2):501-509; 1976.

Experiments were undertaken to estimate the drug-metabolizing capacity (V_{max}) and the dose yielding affinity $V_{max}/2$(Kd) from demethylation rates, measured by $^{14}CO_2$ exhalation in Wistar rats. Various doses of ^{14}C-aminopyrine were injected i.v. to unanesthetized rats. Drug clearances based on $^{14}CO_2$ exhalation agreed well with those derived from plasma disappearance rates. Evaluation of dose-response curves revealed saturation phenomena. In the normal rat, a V_{max} of 173 nmol/min/100 g and a K_d of 26 μmol/100 g were calculated. Enzyme induction with phenobarbital increased V_{max} to 745 nmol/min/100 g, whereas in the rat with portacaval shunt, it was reduced to 45 nmol/min/100 g. After 48-hr bile duct ligation, V_{max} was not significantly different from the controls, but K_d increased to 36 μmol/100 g, compatible with a competitive type of inhibition of aminopyrine demethylation. Two-thirds hepatectomy reduced V_{max} by only 50%, suggesting that a substantial portion of demethylation occurs extrahepatically. This appears to be a valid alternative to conventional plasma clearance methods, allowing interpretation of some mechanisms affecting *in vivo* drug metabolism under various conditions.

1652 COMPARTMENTATION OF ALBUMIN AND FERRITIN SYNTHESIS IN RAT LIVER IN VIVO. (Eng.) Fern, E. B.; Garlick, P. J. (Dept. Biochemistry, Univ. Wisconsin, Madison, WI 53706). *Biochem. J.* 156(1):189-192; 1976.

Further evidence of cellular compartmentation of aminoacyl-transfer RNA was obtained by comparing the specific radioactivity of serine with that of glycine in albumin and ferritin in 12 rat livers. Although the specific radioactivities of free glycine and serine rose between 3-6 hr of [U-^{14}C]glycine infusion, their ratio (serine/glycine) remained constant. The specific radioactivity ratio in total liver protein was also constant and much closer to that of the free amino acids in liver than in either arterial or hepatic portal plasma. With albumin, the specific radioactivity ratio was better related to the free pool in liver than to that in either plasma. These results suggest that the precursor pool for protein synthesis is more directly related to intracellular amino acids than to those in plasma. In both normal rats and rats in which ferritin synthesis had been previously induced with an s.c. injection of 10 mg of iron sorbitol, the specific radioactivity ratio in the liver ferritin was very close to that in the total liver protein, whereas, in albumin it was lower. The results suggest that albumin and ferritin are not synthesized from the same pool of free amino acids.

1653 ETHANOL--A DIRECT INDUCER OF DRUG METABOLISM. (Eng.) Kalant, H.; Khanna, J. M.; Lin, G. Y.; Chung, S. (Dept. Pharmacology, Univ. Toronto, Toronto, Ontario, Canada). *Biochem. Pharmacol.* 25(3):337-342; 1976.

The inductive effects of chronic phenobarbital and ethanol ingestion on hepatic microsomal drug metabolism were examined in Wistar rats which consumed different proportions of dietary fat. Eight groups of rats were fed for 1 week on matched amounts of nutritionally adequate liquid diets providing 2, 5, 10, or 41% of calories as fat (safflower oil); 2 groups were at each level. One group at each level received phenobarbital (80 mg/kg daily by intubation); the other received water. In a parallel experiment, 1 group at each fat level received 36% of calories as ethanol, the other as sucrose, and these regimens were continued for 1 month. Dietary fat content had no significant effect on body weight, liver weight, microsomal protein, cytochrome P-450 content, or hepatic triglycerides (TG) during the 1-week experiment, but it significantly increased all these measures in the 1-month experiment. Both phenobarbital and ethanol treatment increased all these measures except body weight. Phenobarbital had a greater effect on liver weight, microsomal protein, and cytochrome P-450, while ethanol had a greater effect on hepatic TG and a significant interaction with dietary fat content in relation to TG levels. In contrast, microsomal metabolism of aminopyrine, aniline, and meprobamate *in vitro* was increased almost equally by phenobarbital and ethanol, while dietary fat content had no effect alone, and no significant interaction with phenobarbital or ethanol. Ethanol, like phenobarbital, therefore, appears to induce microsomal drug metabolism independently of its effects on TG metabolism.

1654 MECHANISMS OF INCREASED α_1-FETOPROTEIN PRODUCTION IN HEPATIC INJURY. (Eng.)

Watanabe, A.; Miyazaki, M.; Taketa, K. (Okayama Univ. Medical Sch., 5-1, 2-chome, Shikata-cho, Okayama 700, Japan). *Experientia* 32(4):470-471; 1976.

The association of increased serum α_1-fetoprotein (AFP) and increased DNA synthesis seen in liver damage was investigated in 35-day-old Sprague-Dawley rats given an i.p. injection of thioacetamide (5 mg/100 g) or DL-ethionine (100 mg/100 g). Administration of ATP to ethionine-treated rats inhibited the rise in serum AFP and liver damage (triglyceride content and glucose-6-phosphate dehydrogenase). The low dose of thioacetamide caused neither any evidence of liver cell injury nor increased production of AFP, even in the presence of accelerated DNA synthesis. Thus, the increased production of AFP in injured liver is primarily associated with hepatic injury and not with liver cell regeneration.

1655 INFLUENCE OF PYRAZOLE ON HEPATIC [1-^{14}C] PALMITATE OXIDATION DURING ACUTE ETHANOL INTOXICATION. (Eng.)

Beauge, F.; Clement, M.; Nordmann, J.; Nordmann, R. (Hopital de la Salpetriere, 47, Boulevard de l'Hopital-75013 Paris, France). *Biomedicine* [*Express*] 25(2):70-71; 1976.

The effects of pyrazole on alcohol-induced inhibition of hepatic palmitate oxidation were studied in female Wistar rats. Pyrazole (272 mg/kg, i.p.) was injected 10 min before ethanol intubation (4 mg/kg). Liver slices were then incubated with 1-^{14}C-palmitic acid, and the evolved $^{14}CO_2$ was estimated. Pyrazole reduced, but did not completely suppress, the inhibition of palmitate oxidation 1.5 hr after ethanol administration, and it failed to affect this inhibition significantly 4 hr after intubation. At 20 hr after intubation, there were no disturbances of palmitate oxidation, and at 30 hr, there was a significant ($p<0.01$) inhibition of palmitate oxidation in rats treated with pyrazole, confirming the relation between active ethanol metabolism and inhibition of fatty acid oxidation. It is concluded that pyrazole is not a convenient agent for studying the mechanisms of fatty liver induction or the role of decreased fatty acid oxidation by ethanol.

1656 MEASUREMENT OF BILE ACID SYNTHESIS BY $^{14}CO_2$: THE METABOLISM OF PROPIONYL CoA.

(Eng.) Davis, R. A.; Showalter, J. P.; Kern, F., Jr. (Univ. Colorado Medical Center, Denver, CO 80220). *Steroids* 26(4):408-421; 1975.

The relation between $^{14}CO_2$ evolution from the catabolism of [26 or 27^{14}C]cholesterol to bile acids was studied in female Sprague-Dawley rats with biliary fistulae. When equal quantities of [26 or 27^{14}C]-cholesterol and [4^{14}C]cholesterol were administered, there was a significant linear relationship between $^{14}CO_2$ expiration in the breath and [4^{14}C] bile acid excretion in the bile. Bile acid synthesis calculated as the ratio of $^{14}CO_2$ to molar specific activity of biliary cholesterol correlated highly with biliary bile acid excretion in the bile acid-depleted rat. Phenobarbital (80 mg/kg/day, 7 days, i.m.) did not alter the relation between the $^{14}CO_2$ estimation of bile acid synthesis and biliary bile acid excretion, indicating that the relation between [26 or 27^{14}C]-cholesterol side chain cleavage and $^{14}CO_2$ formation was not altered. Phenobarbital did cause a reduction in bile acid synthesis, as measured by $^{14}CO_2$ evolution and by biliary bile acid excretion. The $^{14}CO_2$ method underestimated bile acid synthesis by 12.2 and 8.7% in untreated and phenobarbital treated rats, resp. Since 11% of the radioactivity, expired as $^{14}CO_2$, was isolated as bile acids, radioactivity cleaved as [1 or 3^{14}C]propionyl coenzyme A (CoA) may enter cholesterol-bile acid biosynthesis resulting in the underestimation of bile acid synthesis. To determine whether radioactivity from propionyl CoA enters steroid biosynthesis, [1^{14}C]propionate and [2^{14}C]propionate (3.5 μCi) were injected i.p. in untreated biliary fistula rats, and the biliary lipids excreted after 60 hr were analyzed. Incorporation of radioactivity into cholesterol and bile acids was greater after the administration of [2^{14}C]-propionate than after [1^{14}C]propionate, suggesting that radioactivity from propionyl CoA may enter steroid biosynthesis by metabolic events in which the methylene and carboxyl carbon atoms are differentiated. Although the use of $^{14}CO_2$ expiration from [26 or 27^{14}C]cholesterol catabolism under-

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estimates the rate of bile acid synthesis, it should have many applications because of the constant relation between $^{14}CO_2$ formation and cholesterol side chain cleavage.

1657 FORMATION OF BILE ACIDS IN MAN. METABOLISM OF 7α-HYDROXY-4-CHOLESTEN-3-ONE IN NORMAL SUBJECTS WITH AN INTACT ENTEROHEPATIC CIRCULATION.

(Eng.) Hanson, R. F.; Szczepanik, P. A.; Klein, P. D.; Johnson, E. A.; Williams, G. C. (Gastroenterology Unit, Univ. Minnesota, Minneapolis, MN 55455). *Biochim. Biophys. Acta* 431(2): 335-346; 1976.

The metabolism of labeled 7-alpha-hydroxy-4-cholesten-3-one (HCO) was investigated in eight normal subjects with intact enterohepatic circulation to determine whether the entire production of cholic acid and chenodeoxycholic acid takes place via HCO. In six of eight subjects, the area under the cholic acid specific activity decay curve was significantly less than the area under the chenodeoxycholic acid specific activity decay curve, indicating that the entire production of cholic acid and deoxycholic acid does not take place via HCO. The production rates ranged from 0.49 to 1.18 nmol/day for cholic acid and 0.64 to 1.20 nmol/day for chenodeoxycholic acid. The fraction of the injected ^{3}H-labeled HC metabolized to cholic acid and chenodeoxyxholic acid was calculated in these six subjects at 0.51 for cholic acid and at 0.55 for chenodeoxycholic acid. These results show that the production of cholic acid in man may not always involve the intermediate 7-alpha hydroxy-4-cholesten-3-one.

1658 INFLUENCE OF CHOLESTEROL FEEDING ON LIVER MICROSOMAL METABOLISM OF STEROIDS AND BILE ACIDS IN CONVENTIONAL AND GERM-FREE RATS.

(Eng.) Gustafsson, B. E.; Einarsson, K.; Gustafsson, J. A. (Karolinska Institutet, Stockholm, Sweden). *J. Biol. Chem.* 250(21):8496-8502; 1975.

The factor responsible for the differences in microsomal metabolism of steroids between germ-free and conventional rats was investigated. A diet containing 0.4% (weight/weight) cholesterol, cholic acid, taurocholic acid, and chenodeoxycholic acid was fed to conventional and germ-free male rats, and the effect on liver microsomal metabolism of 4-[4-^{14}C]androstene-3,17-dione, 5α[4-^{14}C]androstane-3α,17β-diol, [4-^{14}C]cholesterol, 7α-hydroxy-4-[6β-^{3}H]cholesten-3-one, and [24-^{14}C]lithocholic acid was studied. The most consistent effects were found with dietary cholesterol. It stimulated the activities of several of the hydroxylases active on 4-androstene-3,17-dione and 5α-androstane-3α,17β-diol; it decreased the 5α reduction of 4-androstene-3,17-dione; it increased the 7α hydroxylation of cholesterol; it decreased the 12α hydroxylation of 7α-hydroxy-4-cholesten-3-one; and it increased the hydroxylation of lithocholic acid by 6β. These effects of cholesterol feeding on the microsomal metabolism of steroids in conventional rats made the pattern of microsomal enzyme activities resemble that characteristic of germ-free rats. Cholesterol feeding led to a pronounced increase in the intestinal concentration of β-muricholic acid in conventional rats. Cholesterol feeding to conventional animals led to an intestinal ratio of chenodeoxycholic acid (including its metabolites α- and β-muricholic acid and hyodeoxycholic acid) to cholic acid (including deoxycholic acid) that was almost identical to that in germ-free rats. Conventionalization of germ-free rats for a period of up to 56 days led only to a partial normalization of the liver microsomal metabolism of 5α-[4-^{14}C]androstane-3α,17β-diol and 7α-hydroxy-4-[6β-^{3}H]cholesten-3-one and of the liver microsomal concentration of cytochrome P-450. The concentration of cholesterol was higher in both total liver homogenate and liver microsomal fraction of germ-free rats than in corresponding preparations from conventional rats. It is suggested that cholesterol is one of the factors responsible for the different microsomal metabolism of steroids in germ-free and conventional rats. It is also suggested that cholesterol may play a role as regulator of microsomal enzyme activities.

1659 INHIBITORY EFFECTS OF SCILLAREN AND DINITROPHENOL ON BILIRUBIN EXCRETION BY THE ISOLATED PERFUSED RAT LIVER.

(Eng.) Bloomer, J. R.; Zaccaria, J.; Klatskin, G. (Yale Univ. Sch. Medicine, 33 Cedar St., New Haven, CT 06510). *Proc. Soc. Exp. Biol. Med.* 151(3):539-542; 1976.

The effects of scillaren (a mixture of cardioactive glycosides from fresh squill) and dinitrophenol on bilirubin excretion by the perfused Wistar rat liver were studied. Ninety milliliters of perfusing medium, consisting of sheep RBC, 3 g/100 ml bovine albumin, and 100 mg/100 ml glucose, were perfused at 20 ml/min for 3 hr. Bilirubin was infused into the medium at 18.8 μg/min/g of liver or 7.9 μg/min/g 30 min after the perfusion was initiated. Sodium taurocholate (30 μmol/hr) was infused simultaneously, and 60 min later, either 25 mg of scillaren or 16.6 mg of 2,4-dinitrophenol was added to the perfusing medium. Both compounds inhibited bile flow, scillaren by 20-40% and dinitrophenol by 60-80%. Bilirubin excretion was also impaired. However, the effect of scillaren on bilirubin excretion was less than that on bile flow, as indicated by an increase in the bile bilirubin concentration. Dinitrophenol had a greater effect on bilirubin excretion than on bile flow. Dinitrophenol also inhibited the hepatic removal of unconjugated bilirubin from the perfusate, probably because it impaired the initial uptake and/or storage of unconjugated bilirubin by the perfused liver.

1660 HEPATOCELLULAR TRANSPLANTATION FOR METABOLIC DEFICIENCIES: DECREASE OF PLASMA BILIRUBIN IN GUNN RATS.

(Eng.) Matas, A. J.; Sutherland, D. E. R.; Steffes, M. W.; Mauer, S. M.; Lowe, A.; Simmons, R. L.; Najarian, J. S. (Dept.

Surgery, Univ. Minnesota, Minneapolis, MN 55455). *Science* 192(4242):892-894; 1976.

Hepatocytes from heterozygous Gunn rats were transplanted in homozygous recessive Gunn rats, which had a uridine diphosphate glucuronyltransferase deficiency, to develop a hepatocellular transplantation method that could be used in human enzyme deficiency diseases. All recipients received 100 U of sodium heparin s.c. 1 hr preoperatively and rabbit antiserum to rat lymphocytes for 12 weeks postoperatively. In eight rats receiving hepatocellular transplants via the portal vein, concentrations of bilirubin fell gradually, and after 3 weeks, postoperative values were significantly lower than preoperative values; this effect lasted for 30 weeks in two animals. Similar results were obtained in a second series of experiments, in which the alkaline azobilirubin blue reaction was used to measure bilirubin (preoperative, 10.45 mg/100 ml; 5 weeks postoperative, 5.5 mg/100 ml, $p<0.01$). No significant differences in bilirubin levels were seen in eight rats receiving Hanks solution through the portal vein, in five rats receiving spleen cells via the portal vein, or in four rats receiving hepatocytes dispersed in the peritoneal cavity. The results indicate that hepatocellular transplantation provides the missing enzyme in these rats. It is concluded that this method may be applicable to human congenital enzyme deficiency disease.

1661 THE INFLUENCE OF DIET ON UNCONJUGATED HYPERBILIRUBINAEMIA IN THE GUNN RAT.

(Eng.) Gollan, J. L.; Hatt, K. J.; Billing, B. H. (Royal Free Hosp., Pond St., Hampstead, London NW3 2QG, England). *Clin. Sci. Mol. Med.* 49(3):229-235; 1975.

The influence of dietary carbohydrate, protein, and lipid on the unconjugated hyperbilirubinemia of Gunn rats was studied. After a control period without restraint, animals were restrained for 72 hr and were either starved or given isocaloric amounts of glucose, protein hydrolysate, or soybean oil through a gastrotomy cannula. A second study was performed with groups of unrestrained animals that were fed with diets supplemented with carbohydrate, protein, and lipid for 7 days after a control period. Both studies showed that diets composed predominantly of carbohydrate or protein doubled the plasma bilirubin concentration. Starch, glucose, and fructose produced similar effects. A high-lipid diet in the absence of carbohydrate caused a slight reduction in plasma bilirubin concentration. This effect was observed with both soybean oil and pork fat. The findings do not indicate whether the increase in hyperbilirubinemia resulted from the high carbohydrate content of the diet or from the absence of lipid.

1662 PATHOGENESIS OF COPPER DEPOSITION IN LIVER CELLS.

(Eng.) Iyenegar, B. (B-72 Pandra Rd., New Delhi-3, India). *Acta Morphol. Acad. Sci. Hung.* 22(2):169-175; 1974.

Copper deposition in the rat liver was studied after the intracardiac injection of copper sulfate (2 μg/100 g). Copper deposition in the hepatocytes increased gradually, reaching a peak after 5 days. An intense, diffuse deposition was seen in the cytoplasm, the area of the cell membrane, nuclear membrane, and the chromatin. Thus, the sinusoids of the liver passed the bound copper directly to the hepatocytes. After 7 days, the deposition was restricted to the centrilobular cells; there was also a dense deposition in the Kupffer cells, which had previously shown little or no deposition. The apparent transfer of copper from the hepatocytes to the Kupffer cells indicates that the removal of copper by the Kupffer cells protects the hepatocytes from the prolonged action of copper.

1663 THE CAPABILITY FOR HORMONE-STIMULATED ENZYME ADAPTATION IN LIVER CELLS ISOLATED FROM AGING RATS.

(Eng.) Britton, G. W.; Britton, V. J.; Gold, G.; Adelman, R. C. (Philadelphia Coll. Osteopathic Medicine, Philadelphia, PA). *Exp. Gerontol.* 11(1/2):1-4; 1976.

Hepatocytes isolated from male Sprague-Dawley rats aged 2-24 months were incubated with hydrocortisone to determine whether the resulting increase in tyrosine aminotransferase varied with age. When the hepatocytes were incubated up to 5 hr with 2.1 x 10^{-5} M hydrocortisone, both time course and magnitude of the increased tyrosine aminotransferase activity were identical for 2- and 24-month old rats. These data support the concept that previously documented age-dependent changes in liver enzyme adaptation probably reflect alterations in extrahepatic regulatory mechanisms.

1664 CHANGES IN CATECHOLAMINE- AND GLUCAGON-RESPONSIVE ADENYLATE CYCLASE ACTIVITY IN PRENEOPLASTIC RAT LIVER.

(Eng.) Boyd, H.; Martin, T. J. (Univ. Miami Sch. Medicine, Miami, FL 33152). *Mol. Pharmacol.* 12(2):195-202; 1976.

Pharmacological studies of adenylate cyclase activation were undertaken in preneoplastic rat liver with respect to alpha and beta adrenergic receptors and glucagon receptors. Increases in basal and catecholamine-responsive adenylate cyclase activity were observed in the livers of Sprague-Dawley rats treated with 3'-methyl-4-dimethylaminoazobenzene (3'-MeDAB, 0.06% in diet, 1-12 weeks). These increases were accompanied by a decrease in glucagon responsiveness of the enzyme. Binding of 3'-MeDAB metabolites reached a peak at 3 weeks, considerably earlier than the peak increases in adenylate cyclase activity at 6 weeks. By the time tumors were detected in the tissue (10-20 weeks), adenylate cyclase activity and response to catecholamine stimulation were back to or below normal. The greatly increased stimulation of adenylate cyclase activity by catecholamines was a beta receptor effect; however, inhibition of the enzyme by catecholamines was also seen when there was elevated basal activity, and

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this may be an alpha adrenergic effect. The fact that glucagon and catecholamine effects are additive at certain concentrations of catecholamine, but only partially so at others, indicates that the two receptor-cyclase systems are not entirely separate. The preneoplastic rat liver appears to be a suitable tissue to study hormone-receptor interactions at both molecular and physiological levels. It was the first broken cell preparation in which inhibitory effects of catecholamines on adenylate cyclase activity were observed.

1665 RATES OF INDUCTION OF MITOCHONDRIAL ALDEHYDE DEHYDROGENASE IN RAT LIVER. (Eng.) Horton, A. A.; Barrett, M. C. (Dept. Biochemistry, Univ. Birmingham, P.O. Box 363, Birmingham B15 2TT, U.K.). *Biochem. J.* 156(1):177-179; 1976.

The rate of induction of aldehyde dehydrogenase activity was studied in liver mitochondria isolated from female Wistar rats which were given ethanol (25% weight/volume, 2 ml portions) by gastric intubation at hourly intervals up to 5 hr. There was an initial lag period of nearly 1 hr followed by a rapid increase in aldehyde dehydrogenase specific activity until a maximum was attained at 3 hr. Aldehyde dehydrogenases from control rats, given a quantity of glucose that was isocaloric with the ethanol, showed no change in specific activity. It is concluded that the rapid increase in specific activity of mitochondrial aldehyde dehydrogenase is a response to the increased concentrations of acetaldehyde resulting from the higher rate of oxidation of ethanol, and it probably constitutes a protective mechanism for the removal of acetaldehyde.

1666 THE REGULATION OF 3-HYDROXY-3-METHYLGLUTARYL COENZYME A REDUCTASE IN THE ISOLATED PERFUSED RAT LIVER. (Eng.) Cooper, A. D. (Stanford Univ. Sch. Medicine, Stanford, CA 94305). *J. Clin. Invest.* 57(6):1461-1470; 1976.

To determine the sterol component(s) of bile that primarily regulates the rate of hepatic cholesterol synthesis, the effect of perfusion of an isolated Sprague-Dawley rat liver on hepatic 3-hydroxy-3-methylglutaryl coenzyme A reductase was studied. In liver removed during the basal period of the diurnal cycle of enzyme activity, a 227 ± 41% increase in enzyme activity occurred after 3 hr of a plasma-free perfusion. The addition of cycloheximide or pure cholesterol (dispersed with lecithin) to the perfusate prevented this increase in enzyme activity. In contrast, the continuous addition of taurocholate or taurochenodeoxycholate, alone or in combination, at a variety of rates did not prevent the increase in enzyme activity. The added bile salts were efficiently extracted from the perfusate and were excreted in the bile. The addition of these bile salts to a cholesterol-enriched perfusate did not alter the effect obtained with cholesterol alone. If the perfusate contained whole serum, the increase induced by perfusion in the basal period was smaller (88 ± 27%) than with plasma-free perfusate. Again, the major bile salts of the rat failed to prevent the increase in enzyme activity induced by liver perfusion. If livers were removed and perfused at the height of the diurnal cycle of enzyme activity, the enzyme activity remained high (2 ± 10% increase) rather than decreasing, as occurs *in vivo*. If cholesterol was added to these perfusions, a 52 ± 4% decrease was induced. Bile salt addition induced no decrease. It is concluded that the major bile salts are not direct regulators of hepatic cholesterol synthesis, but pure cholesterol, in the absence of bile salt or lipoprotein, is able to initiate the mechanism that represses hepatic 3-hydroxy-3-methylglutaryl coenzyme A reductase.

1667 EFFECTS OF PHENOBARBITAL AND 3-METHYLCHOLANTHRENE ADMINISTRATION ON GLUTATHIONE-S-EPOXIDE TRANSFERASE ACTIVITY IN RAT LIVER. (Eng.) Mukhtar, H.; Bresnick, E. (Medical Coll. Georgia, Augusta, GA 30902). *Biochem. Pharmacol.* 25(9):1081-1084; 1976.

The effect of phenobarbital and 3-methylcholanthrene on glutathione-*S*-epoxide transferase activity in Sprague-Dawley rat liver was studied using three epoxide substrates. The specific activities in the high-speed liver supernatant fraction for 3-methylcholanthrene 11,12 oxide, styrene oxide, and 3,3,3-trichloro-1,2 epoxy propane were 5.7, 86.4, and 165 nmol/5 min/mg protein, resp. Phenobarbital (75 mg/kg, i.p., for 3 days) or 3-methylcholanthrene (20 mg/kg for 2 days) pretreatment resulted in a 40-60% increase in enzyme activity. β-Naphthoflavone (100 mg/kg, 2 days) had no effect on glutathione-*S*-epoxide transferase activity. The results indicate that the conjugation of the polycyclic hydrocarbon oxides with glutathione is elevated in the rat liver by pretreatment with phenobarbital or methylcholanthrene.

1668 ENHANCEMENT BY PHENOBARBITAL OF SOME EFFECTS OF CARBON TETRACHLORIDE ON MOUSE LIVER. (Eng.) Gans, J. H.; Korson, R.; Herman, J. (Coll. Medicine, Univ. Vermont, Burlington, VT 05401). *Biochem. Pharmacol.* 25(5):557-561; 1976.

The interaction of chronic CCl_4 and phenobarbital administration was studied in mice. Corn oil or a corn-oil CCl_4 mixture was administered p.o. twice a week for 7 or 8 weeks to male Swiss mice, which were maintained without or with phenobarbital sodium (30 mg/100 ml) in the drinking water. There was a significant increase in liver weight in CCl_4-treated mice maintained without phenobarbital Na in the drinking water and killed 48 hr after the last treatment. Histologically, livers from these CCl_4-treated mice were composed of areas of necrosis within lobules of regenerating hepatocytes, but deposition of collagen was scant. Synthesis of DNA, protein, and fatty acids *in vitro* was increased in liver tissue from CCl_4-treated mice. Combined treat ment with phenobarbital and CCl_4 produced additional significant increases in liver weight, but collagen deposition was slight. In liver tissue from mice treated with both phenobarbital and CCl_4, synthesis of DNA *in vitro* was significantly increased, protein synthesis was modestly increased, and fatty acid synthesis was unchanged when compared with liver tissue from CCl_4-treated mice, which were not given the barbiturate. Thus, phenobarbital did not accelerate or promote cirrhosis in livers of CCl_4-treated mice but it did enhance the effects of chronic CCl_4 treatment on liver weight, liver DNA synthesis, and, to a lesser extent, on liver protein synthesis.

1669 THE PARTICIPATION OF 2-BUTANONE IN 2-BUTANOL-INDUCED POTENTIATION OF CARBON TETRACHLORIDE HEPATOTOXICITY. (Eng.) Traiger, G. J.; Bruckner, J. V. (Sch. Pharmacy, Univ. Kansas, Lawrence, KS 66045). *J. Pharmacol. Exp. Ther.* 196 (2):493-500; 1976.

The role of alcohol metabolism in 2-butanol-induced potentiation of carbon tetrachloride (CCl_4) hepatotoxicity was studied in male Sprague-Dawley rats. Animals were sacrificed at various times after the administration of 2-butanol (2.2 ml/kg, p.o.) to determine blood 2-butanol and 2-butanone concentrations by gas chromatographic analysis. 2-Butanol exhibited an apparent elimination half-life of 2.5 hr. With the decline of 2-butanol concentrations, there was a rise in 2-butanone blood concentrations, with 43 mg/100 ml detected at 1 hr and a maximum of 105 mg/100 ml detected 4 hr following the administration of the alcohol. A 16-hr pretreatment with either 2-butanol (2.2 ml/kg, p.o.) or 2-butanone (1.87 ml/kg, p.o.) markedly enhanced the hepatotoxic response of CCl_4 (0.1 ml/kg, i.p.), as measured by serum glutamic pyruvic transaminase activity, hepatic glucose-6-phosphatase activity, and triglyceride content. The enhanced hepatotoxicity produced by 2-butanol was not significantly different from that produced by 2-butanone. The potentiation of CCl_4 hepatotoxicity by both agents was substantiated morphologically. The results suggest that 2-butanone production via the oxidation of 2-butanol appears to contribute to the marked response of 2-butanol.

1670 THE ROLE OF SERUM ALBUMIN IN THE HEPATIC EXCRETION OF IODIPAMIDE. (Eng.) Song, C. S.; Beranbaum, E. R.; Rothschild, M. A. (New York Univ. Sch. Medicine, New York, NY 10010). *Invest. Radiol.* 11(1):39-44; 1976.

The role of serum albumin on hepatic uptake and excretion of iodipamide was investigated in the isolated perfused rabbit liver. With the perfusate containing fully reconstituted rabbit plasma protein or 3.5 g/100 ml rabbit albumin alone, the iodipamide excretion was initially extremely slow. It then increased gradually to about 6 μg/g liver/min for 60 min; thereafter it remained constant. The half-time of transfer to the bile was about 130 min. Without albumin in the perfusate, the initial clearance rate of iodipamide was rapid, with half-time transfer to the bile of about 40 min. Rabbit serum globulins had no effect on iodipamide excretion. Thus, binding of iodipamide to albumin retards the transfer of iodipamide from plasma to the bile. This is probably due to competition between albumin and the anion binding protein of the liver.

1671 THE INFLUENCE OF DYE INFUSION RATE AND HEPATIC PLASMA FLOW ON INDOCYANINE GREEN CLEARANCE. (Eng.) Krarup, N.; Larsen, J. A. (Inst. Physiology, Univ. Aarhus, Universitetsparken, DK-8000 Aarhus C, Denmark). *Scand. J. Clin. Lab. Invest.* 36(2):183-188; 1976.

The hepatic clearance and extraction ratio of indocyanine green (ICG) were examined in 22 anesthetized cats when the infusion rate of the dye was increased stepwise and when the hepatic plasma flow was altered by replacing blood (15 ml/kg) with equal volumes of RBC, plasma, or dextran. Blood replacement with dextran increased the ICG elimination. Both plasma clearance and extraction ratio were independent of ICG infusion rate but they were dependent upon hepatic plasma flow. In contrast, a clearance calculated from the dye elimination rate and the estimated average hepatic plasma concentration of ICG was independent of changes in hepatic plasma flow. It is concluded that the plasma clearance and extraction ratio of indocyanine green are not ideal for estimating liver function. However, when clearance is calculated from the average hepatic plasma concentration of the dye, it becomes independent of hepatic plasma flow and is thus a more reliable index of liver function.

1672 THE PORPHYRINOGENIC EFFECTS OF KRYPTOPYRROLE IN THE RAT AND THE OCCURRENCE OF URINARY KRYPTOPYRROLE IN HUMAN HEREDITARY HEPATIC PORPHYRIA. (Eng.) Brodie, M. J.; Graham, D. J. M.; Thompson, G. G.; Moore, M. R.; Goldberg, A. (Stobhill General Hosp., Glasgow G21 3UW, Scotland). *Clin. Sci. Mol. Med.* 50(5):431-434; 1976.

The effect of kryptopyrrole on porphyrin synthesis was studied in 24 Sprague-Dawley rats. In addition, urinary kryptopyrrole excretion was studied in 17 patients with acute intermittent porphyria, hereditary coproporphyria, or variegate porphyria. Daily injections of 160 μmol of kryptopyrrole for 4 days increased urinary excretion of coproporphyrin and uroporphyrin in rats. Treatment with 0.119 μmol of δ-aminolevulinic acid (ALA) increased urinary excretion of coproporphyrin, uroporphyrin, ALA, and porphobilinogen. In animals treated with combined ALA and kryptopyrrole, the increase in porphyrin excretion was greater than the combined increases when ALA and kryptopyrrole were given separately. Kryptopyrrole was present in the urine of all patients with hereditary hepatic porphyria, in attack and in remission, but not in those with latent porphyria or in 10 normal subjects. The absence of

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kryptopyrrole in patients with latent porphyria suggests that it may be associated with changes, which transform latency to activity.

1673 RECIRCULATION AND REUTILIZATION OF MICELLAR BILE LECITHIN.

(Eng.) Robins, S. J. (VA Hosp., Boston, MA 02130). *Am. J. Physiol.* 229(3):598-602; 1975.

Bile lecithins solubilized in micellar bile salt and radiolabeled in the 1-acyl fatty acid, phosphorus, and choline positions, were infused in the small bowel of fasted Sprague-Dawley rats. Absorption of each label was virtually complete after 24 hr. However, these lecithins were extensively hydrolyzed in the bowel lumen as well as after absorption, and neither the fatty acid nor phosphorus was significantly retained in the enterohepatic circulation nor were they reutilized for biliary lecithin synthesis. While choline was also dissociated from absorbed lecithin, it was retained in the liver, reincorporated into newly synthesized hepatic lecithin, and secreted in biliary lecithin in 10-fold greater amounts than either the fatty acid or phosphorus. However, the extent of choline incorporation into bile lecithin was limited and was not further increased when free choline was directly injected into the portal vein. These data suggest that although only choline of absorbed lecithin is retained in the enterohepatic circulation and preserved for new biliary lecithin synthesis, exogenous choline utilization is regulated by the size of the available hepatic pool.

1674 LIGANDIN REVERSES BILIRUBIN INHIBITION OF LIVER MITOCHONDRIAL RESPIRATION IN VITRO.

(Eng.) Kamisaka, K.; Gatmaitan, Z.; Moore, C. L., Arias, I. M. (Albert Einstein Coll. Medicine, Bronx, NY). *Pediatr. Res.* 9(12):903-905; 1975.

The protective effect of ligandin on bilirubin-induced inhibition of mitochondrial respiration and phosphorylation was studied in Sprague-Dawley rats. Ligandin prevented the inhibitory effect of bilirubin on respiration and oxidative phosphorylation by isolated rat liver mitochondria. At equimolar concentrations of bilirubin and ligandin or human serum albumin, mitochondrial respiration was fully restored to control values. At greater ratios of bilirubin and ligandin or human serum albumin, the latter had a stronger protective effect. These studies suggest that ligandin may have a physiologic role in protecting mitochondrial systems against bilirubin toxicity.

1675 MODIFICATION OF PARACETAMOL TOXICITY BY ANTIOXIDANTS.

(Eng.) Kelleher, J.; Walker, B. E.; Keaney, N. P.; Losowsky, M. S.; Dixon, M. F. (St. James's Hosp., Leeds LS9 7TF, U.K.). *Biochem. Soc. Trans.* 4(2):292-294; 1976.

The effects of antioxidants against paracetamol hepatotoxicity were studied in Wistar rats. Groups of eight animals were pretreated with *NN*′-diphenyl-*p*-phenylenediamine (600 mg/kg), propylgallate (300 mg/kg), or tragacanth (control) at 72, 48, 24, and 6 hr before p.o. administration of paracetamol. At 48 hr, mortality in the control group was 0 of 24 as compared with 10 of 24 in animals treated with 12.8 or 19.2 nmol/kg paracetamol ($p<0.001$). At 6.4 nmol/kg paracetamol (at which dose all animal survived), the control group had only one animal wit high plasma aspartate aminotransferase activity at 24 hr, whereas four of eight in the group treated wi *NN*′-diphenyl-*p*-phenylenediamine had high enzyme leve For each experiment, the propylgallate-pretreated animals had a significantly lower mean enzyme activity, and none of these rats died, compared wit 3 of 16 control animals, after treatment with 19.2 nmol/kg of paracetamol. The fact that *NN*′-diphenyl-*p*-phenylenediamine enhanced rather than diminished hepatotoxicity suggests that the paracetamol toxicity is not mediated via a mechanism involvi lipid peroxidation.

1676 EFFECT OF POLYCHLORINATED BIPHENYLS (PCBs) ADMINISTRATION ON PHOSPHOLIPID BIOSYNTHESI IN RAT LIVER.

(Eng.) Ishidate, K.; Nakazawa, Y. (Tokyo Medical and Dental Univ., Tokyo, Japan). *Biochem. Pharmacol.* 25(11):1255-1260; 1976.

The effect of polychlorinated biphenyls (PCB's) or phenobarbital on the biosynthesis of phospholipids in hepatic endoplasmic reticulum of Wistar rats was studied by the i.p. injection of (^{32}P)orthophosphate (Me-^{14}C)choline or (2-^{3}H)glycerol. Significant increases in liver microsomal phospholipid content after the administration by gastric intubation of either PCB's (100 mg/kg/day) or phenobarbital (80 mg kg/day) indicated the actual proliferation of endoplasmic reticulum membranes. The rate of both (^{32}P) and (^{14}C) incorporations into microsomal choline-containing phospholipids, such as phosphatidylcholine, sphingomyelin and lysophosphatidylcholine, was reduced to one-fifth by PCB's administration, compared with control animals. The incorporation of (^{32}P)orthophosphate into phosphatidylethanolamine or other phospholipid classes was less or not affected, resp., by PCB's administration. The specifi inhibitory effect of PCB's on the incorporation into choline-containing phospholipids was not observed when (2-^{3}H)glycerol was used as a precursor. However, phenobarbital administration significantly increased the rate of (^{32}P)incorporation into liver phospholipids, especially phosphatidylcholine. It is suggested that the increase in microsomal phospholipid content by PCB's administration is not due to the stimulation of synthesis but is due to the inhibition of the catabolism of membrane phospholipids In addition, the increase in content caused by phenobarbital is due, at least in part, to the stimulatio of synthesis.

1677 INJURIOUS EFFECT ON RAT LIVER MITOCHONDRIA BY LYMPHOCYTES FROM PATIENTS WITH PRIMARY BILIARY CIRRHOSIS.

(Eng.) Bootello, A.; Fernandez-Cruz, E.; Escartin, P.; Blanco, M. F.; Gosalvez, M.;

Segovia de Arana, J. M. (Clinical Puerta de Hierro, San Martin de Porres 4, Madrid 35, Spain). *Clin. Exp. Immunol.* 21(2):374-377; 1976.

The effects of lymphocytes of patients with primary biliary cirrhosis (PBC) on the function of rat liver mitochondria were investigated. Lymphocytes of patients with PBC, as well as those of healthy controls and of patients with other liver diseases were incubated for 20 min with isolated rat liver mitochondria (5-20 x 10^6 cells/mg mitochondrial protein), and the respiratory control (i.e., the ratio between respiration with ADP and respiration without ADP) was determined. In the absence of lymphocytes, mitochondria had an average respiratory control of 8.4, which was considered to be 100%. Mitochondria incubated with lymphocytes of nine normal subjects, of five patients with alcoholic cirrhosis, and of four patients with miscellaneous liver diseases had 80-84% respiratory control, whereas mitochondria incubated with the lymphocytes of seven patients with PBC had 11% respiratory control. The results suggest that the injurious effect of PBC lymphocytes on mitochondria may be a consequence of *in vivo* sensitization of the PBC patients' lymphocytes by the mitochondrial antigen(s).

1678 ABNORMAL LOW DENSITY PLASMA LIPOPROTEINS OCCURRING IN DOGS WITH OBSTRUCTIVE JAUNDICE. (Eng.) Danielsson, B.; Ekman, R.; Johansson, B. G.; Petersson, B. G. (Inst. Biochemistry, Univ. Lund, Lund, Sweden). *FEBS Lett.* 63(1):33-36; 1976.

The plasma lipoprotein distribution was studied in six dogs, by zonal ultracentrifugation, after surgical induction of obstructive jaundice to study the abnormal lipoprotein metabolism in liver-biliary disease. In these and in two sham-operated dogs, two classes of low density plasma lipoproteins that reacted with anti-β-lipoprotein were resolved (LDL_1 and LDL_2). The LDL from the dogs with obstructive jaundice were markedly increased, and an additional LDL_1 fraction without immunoreactivity against anti-β-lipoprotein was found in their plasma. This fraction (designated cholestatic lipoprotein, CLP) resembled the human lipoprotein X in the following respects: both were lipoproteins in the LDL class, occurring in cholestasis with cathodic migration in agar gel electrophoresis; both had high contents of phospholipids and low contents of triglycerides; and both lacked B-protein. The CLP in the dogs, however, differed from the X lipoprotein in the cholesterol ester/cholesterol ratio and apoprotein composition. These differences suggest that obstructive jaundice does not affect the metabolism of cholesterol in the dog in the same way that it does in man.

1679 MODIFICATION OF THE HEPATOTOXICITY OF D-GALACTOSAMINE IN THE RAT BY CYCLOHEXIMIDE. (Eng.) Koff, R. S.; Connelly, L. J. D. (Boston Veterans Admin. Hosp., Boston, MA 02130). *Proc. Soc. Exp. Biol. Med.* 151(3):519-522; 1976.

The effect of cycloheximide on D-galactosamine-induced hepatic necrosis and on hepatic triglyceride accumulation was studied in female CD rats. Twenty-four hr after D-galactosamine (i.p. administration, 375 mg/kg), serum transaminase levels were significantly reduced in animals treated with cycloheximide (1.5 mg/kg) at the same time as, or 4 hr before, D-galactosamine administration. Transaminase levels in rats given cycloheximide 4 hr after D-galactosamine were not reduced. Histological grading of hepatocyte necrosis showed a similar pattern of protection in the pretreated and simultaneously treated groups. Hepatic triglycerides were significantly reduced only in the latter group. Fatality 48 hr after D-galactosamine administration was significantly less common in rats pretreated with cycloheximide (2/14) when compared to rats given D-galactosamine without cycloheximide (9/13), and surviving animals in the cycloheximide-pretreated group had a lower serum transaminase level, a lower necrosis score, and a reduced hepatic triglyceride level. These data support the concept that protein synthesis is important in the pathogenesis of D-galactosamine-induced hepatotoxicity.

1680 ALTERATIONS OF LIVER AND SPLEEN FOLLOWING INTRAVENOUS INFUSION OF FLUOROCARBON EMULSIONS. (Eng.) Rosenblum, W. I.; Hadfield, G.; Martinez, A. J.; Schatzki, P. (Division Neuropathology, Box 17, Medical Coll. Virginia Station, Richmond, VA 23298). *Arch. Pathol. Lab. Med.* 100(4):213-217; 1976.

Swiss mice were injected via tail vein with emulsions of fluorocarbon (FC; 0.5, 1.0, or 1.5 ml), a potential blood substitute. Different types of FC's were used: FC-47 ($C_{12}F_{27}N$), P11D ($C_{14}F_{30}O_2$), E_4 ($C_{14}HF_{29}O_4$), PP-5 ($C_{10}F_{18}$), and PP-9 ($C_{11}F_{20}$). All produced vacuolar changes in hepatocytes, and in reticuloendothelial cells throughout the body. In the liver, occasional inflammatory foci were also observed, but fibrosis was never seen. The vacuolated cells, presumably containing FC, were found as late as 1 yr following a single infusion. However, such cells might also disappear from the liver and spleen. The numbers of affected cells and their rate of disappearance depended on the type of FC, the amount of FC infused, and the length of time between infusion and killing. Fluorodecalins, especially PP-5, produced the least amount of change and the most readily reversible change of all FCs tested. These observations suggest that PP-5 would be more suitable as a blood substitute than the other FC's tested. However, other studies have shown that apparently healthy long-term survival is obtainable even when the infused FC is one that produces extreme vacuolar change in the liver and spleen.

1681 CANALICULAR PERMEABILITY AND HEPATOBILIARY DAMAGE [Abstract]. (Eng.) Bradley, S. E.; Hera, R. (Columbia Univ. Coll. of Physicians and Surgeons, New York, NY). *Clin. Res.* 23(3):439A; 1975.

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1682 STUDIES ON HEPATIC UPTAKE OF ANTIGEN. III. STUDIES OF LIVER MACROPHAGE FUNCTION IN NORMAL RATS AND FOLLOWING CARBON TETRACHLORIDE ADMINISTRATION. (Eng.) Lloyd, R. S.; Triger, D. R. (Royal South Hants Hosp., Southampton, England). *Immunology* 29(2):253-263; 1975.

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1687 INCREASE IN PROTEIN Z CONCENTRATION AND BILIRUBIN-GLUCURONYL-TRANSFERASE ACTIVITY IN THE LIVER OF CLOFIBRATE-TREATED RATS [Abstract]. (Eng.) Foliot, A.; Christoforov, B.; Housset, E.; Petite, J. P.; Ploussard, J. P.; Etienne, J. P. (INSERM U-36, 17 rue du Fer a Moulin, F-75005 Paris, France). *Digestion* 11(5/6):444-445; 1974.

1688 EFFECT OF PROTEIN MALNUTRITION ON HEPATIC DRUG METABOLIZING ENZYMES IN ADULT MALE AND FEMALE RATS. (Eng.) Patel, J. M.; Galdhar, N. R.; Javalgekar, S.; Pawar, S. S. (Natl. Inst. Environmental Health Sciences, Building 14, Post Office Box 12233, Research Triangle Park, NC 27709). *Ind. J. Med. Res.* 63(4):518-524; 1975.

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1701 INTERACTIONS OF INSULIN, GLUCAGON AND RELATED INTESTINAL PEPTIDES WITH THEIR RECEPTORS ON ISOLATED LIVER CELLS [Abstract]. (Eng.) Rancon, F.; Fouchereau, M.; Broer, Y.; Freychet, P.; Rosselin, G. (INSERM U-55, Hopital Saint-Antoine, 184 rue du Faubourg Saint-Antoine, F-75012 Paris, France). *Digestion* 10(3):237-238; 1974.

1702 THE RENAL CLEARANCE OF BILIRUBIN AND BILE ACIDS STUDIED IN AN ISOLATED PERFUSED RAT KIDNEY SYSTEM [Abstract]. (Eng.) Gollan, J. L.; Billing, B. H. (Royal Free Hosp., Pond St., Hampstead, London NW3 2OG, England). *Clin. Sci. Mol. Med.* 49(3):28p; 1975.

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1705 EFFECT OF EXOGENOUS POLYUNSATURATED FATTY ACIDS ON LIPOGENIC ENZYME ACTIVITY IN RAT LIVER UNDER FIXED CARBOHYDRATE CONSUMPTION. (Eng.) Muto, Y.; Shinohara, N.; Banphotkasem, S.; Iitoyo, N.; Hosoya, N. (Faculty Medicine, Univ. Tokyo, Hongo, Tokyo, Japan). *J. Nutr. Sci. Vitaminol.* 21(1):39-47; 1975.

1706 ULTRACHEMICAL STUDIES ON THE METHOD FOR DETERMINING FREE INORGANIC ORTHOPHOSPHATE (P_i) AND ITS DISTRIBUTION IN NORMAL AND CCl_4-DAMAGED HEPATOCYTES IN THE ALBINO MOUSE. (Ger.) Halbhuber, K. (Anatomisches Institut, Friedrich-Schiller-Universitat, Jena, Germany). *Wiss. Friedrich Schiller Univ. Jena, Math.-Naturwiss. Reihe* 23(3/4):471-475; 1974.

1707 TC-99m SULFUR COLLOID (TSC) AND Au-198 COLLOID (AuC) HEPATIC PHAGOCYTOSIS IN THE RAT, DIFFERING MECHANISMS [Abstract]. (Eng.) Haibach, H.; George, E. S.; Hendershott, R.; Donati, R. M. (St. Louis Veterans Admin. Hosp., St. Louis, MO). *Clin. Res.* 23(3):250A; 1975.

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1709 EXPERIMENTAL MODEL OF CHOLESTASIS WITH SUBSEQUENT RESTORATION OF BILE FLOW. (Rus.) Mikhailov, V. N.; Kiianov, V. I. (I. P. Pavlov 1st Leningrad Medical Inst., Leningrad, (USSR). *Patol. Fiziol. Eksp. Ter.* (3):83-85; 1975.

See also, 1567, 1568, 1570, 1747, 1748, 2114, 2179, 2207.

SECRETION AND METABOLISM

Intestine

1710 ORGAN CULTURE OF HUMAN DUODENUM AND JEJUNUM. (Eng.) Hauri, H.-P.; Kedinger, M.; Haffen, K.; Grenier, J.-F.; Hadorn, B. (Universitats-Kinderklinik, Freiburgstrasse 23, CH-3010 Berne, Switzerland). *Biol. Gastroenterol. (Paris)* 8(4):307-319; 1975.

The protein synthesizing ability of human duodenum and jejunum, the effect of different culture media on brush border enzyme activity, and enzyme release into the culture medium were investigated as a function of time. Human duodenal and jejunal mucosal specimens obtained from operations were cultured for 48 hr in Trowell T8 medium. Ultrastructural and ultracytochemical studies revealed a good preservation of the tissue even after 48 hr.

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Protein synthesis, measured by the incorporation of labeled leucine, continued at a constant rate throughout the culture period. When Trowell T8 medium was used, alkaline phosphatase showed an increase up to 24 hr, followed by a decrease to the level of noncultured explants. When RPMI 1640 medium (supplemented with glucose, insulin, and glutamine) was used, alkaline phosphatase showed a sustained increase up to 48 hr. Regardless of the type of medium used, sucrase activity remained constant up to 24 hr and decreased thereafter to a lower level. Total enzyme activity (explant plus medium) showed a 170% increase for alkaline phosphatase and an increase of 320% for aminopeptidase after 48 hr. About 50% of the enzyme activity determined in the medium was bound to particles. The results demonstrate a steady time-dependent increase of total but an unchanged ratio of soluble to nonsoluble enzyme activities in the medium for aminopeptidase and alkaline phosphatase in organ culture, suggesting that a large amount of enzymatic activity is released continuously be cell extrusion.

1711 ENZYMIC SOLUBILIZATION OF THE HUMAN INTESTINAL BRUSH BORDER MEMBRANE ENZYMES.

(Eng.) Maestracci, D. (Faculty Medicine, Universite de Montreal, C.P. 6208, Succursale A, Montreal H3C 3T8, Canada). *Biochim. Biophys. Acta* 433(3):469-481; 1976.

The release of proteins, maltase, lactase, sucrase, trehalase, alkaline phosphatase, γ-glutamyltransferase, and leucylnaphthylamide-hyrolyzing activity from human intestinal brush border membrane vesicles by various enzymes (especially pancreatic proteases) were studied. Full-thickness sections of macroscopically normal small intestine were obtained from 16 patients and were analyzed by electron microscopy, gel electrophoresis, and enzyme assays. The brush border membrane enzymes were not solubilized by digestion with trypsin and chymotrypsin, but they were released after treatment with papain (10 μg/ml) or elastase (18 U/ml). Most of the enzymes were fully active after the proteolytic treatment. All proteins released by papain and elastase were identified by electrophoresis as already known intestinal hydrolases. Electron microscopy of brush border membrane vesicles demonstrated "knob-like" structures (particles) attached to the external side of the membrane. During papain treatment, enzyme removal paralleled the disappearance of the particles. During elastase treatment, it was not possible to correlate the release of the enzymic activities with the removal of the particles. The results indicate that most of the intestinal hydrolases are surface components attached to the external side of the membrane. This supports the concept that the brush border membrane enzymes are organized within the membrane in a mosaic-like pattern.

1712 METABOLISM OF CHENODEOXYCHOLATE BY INTESTINAL MUCOSA.

(Eng.) Rachmilewitz, D.; Saunders, D. R. (Univ. Washington, Sch. Medicine, Seattle, WA). *Gastroenterology* 71(1):82-86; 1976.

The metabolism of ^{14}C-labeled bile salts was studied *in vitro* during their absorption from infused segments of rat and human intestine. The transported bile salts were recovered in transudates, which were collected from the serosal surface of infused segments. In the jejunum, 36% of transported [^{14}C]-deoxycholate and 48% of transported [^{14}C]chenodeoxycholate were recovered as metabolites, which migrated as a seemingly single polar compound, on thin layer chromatography; 52%-72% of these metabolites were deconjugated by cholylglycine hydrolase to yield original [^{14}C]deoxycholate or [^{14}C]chenodeoxycholate resp. The jejunum metabolized 9 times more [^{14}C]-chenodeoxycholate than the ileum (38.1 nmoles/hr/g compared with 4.2 nmoles/hr/g), despite the fact that both segments transferred the same amount of radioactivity. In contrast, [^{14}C]cholate, [^{14}C]-glycocholate, and [^{14}C]glycodeoxycholate were transferred intact by the jejunum, ileum, and colon. Human jejunal and rectal mucosa were able to metabolize [^{14}C]chenodeoxycholate to polar metabolites *in vitro*. Polar metabolites were also found in the portal plasma and jejunal wall 20 min after the intraduodenal injection of [^{14}C]chenodeoxycholate to bile fistula rats. It is suggested that these results complicate the interpretation of *in vitro* experiments on absorption of dihydroxy bile salts, and that they indicate that the human small intestine may be able to metabolize chenodeoxycholate.

1713 RELATIONSHIP BETWEEN THE CHANGES IN GASTRIN LEVELS AND INTESTINAL PROPERTIES IN THE STARVED RAT.

(Eng.) Lichtenberger, L.; Welsh, J. D.; Johnson, L. R. (Peter Bent Brigham Hosp., 721 Huntington Ave., Boston, MA 02115). *Am. J. Dig. Dis.* 21(1):33-38; 1976.

The decrease in intestinal mucosal DNA, RNA, and protein is greater than the loss of body weight in the starved rat; these disproportionate changes were investigated to determine whether they are caused by the low levels of gastrin during starvation. Male King-Holtzman rats (45-day-old) were fasted for 0, 1, 2, 3, or 5 days. Specific lactase and maltase activity increased with progressively longer periods of starvation. Antral and serum gastrin concentration significantly decreased during the 3 days of starvation. Pentagastrin (250 μg/kg, 3 times daily), injected s.c. into a group of rats for the duration of a 3-day starvation period, caused a small but significant increase in the relative intestinal RNA and protein content. Lactase and maltase specific activities were also decreased in comparison with the levels of 3-day starved controls. Pentagastrin partially reversed some the starvation-induced changes, approaching fed levels. Thus, a deficiency in gastrin may be partially responsible for the disproportionate changes in intestinal tissue during starvation.

1714 RELEASE OF MOTILIN AFTER DUODENAL ACIDIFICATION.

(Eng.) Mitznegg, P.; Bloom, S. R.; Domschke, W.; Domschke, S.; Wunsch, E.; Demling, L. (Dept. Pharmacology, Univ. Erlangen-Nurnberg, D-852 Erlangen Universitatsstr. 22, Munich, W. Germany). *Lancet* 1(7965):888-889; 1976.

The effect of intraduodenal infusion of alkaline and acidic solutions was investigated in six male volunteers to determine an agent that would stimulate motilin release in man. The subjects received 3-min infusions of 50 ml 0.3 mol/l "tris" buffer (pH 10.3), 0.1 mol/l HCl, or 0.9% NaCl. After acid infusion, plasma-motilin rose by 90% at 4 min and was still significantly raised at 45 min. There was an insignificant fall in plasma-motilin after alkali and no change after saline. Results indicate that release of motilin after duodenal acidification may be an important factor in inhibiting gastric emptying.

1715 ORGANIC ANIONS INDUCE COLONIC SECRETION.

(Eng.) Bustos-Fernandez, L.; Gonzalez, E.; De Paolo, I. L.; Celener, D.; De Furuya, K. O. (Instituto de Gastroenterologia, Potosi 4215, Buenos Aires, Argentina). *Am. J. Dig. Dis.* 21(4):329-332; 1976.

Colonic function was studied after the instillation of solutions containing acetate or acetic acid, at different pH levels, into the cleansed colons of anesthetized Wistar rats. Isotonic test solutions at an acid (2.9) or neutral (7.0) pH were used. At the lower pH, acetic acid was absorbed and water was secreted. At the higher pH, acetate ions were less well absorbed, and the colon absorbed fluid. The secretory effect could not be reproduced by HCl solutions at pH 2.9. Fluid secretion induced by acetic acid was associated with mucous discharge from goblet cells. The interference of colonic absorption by acetic acid may have importance in some diarrheal diseases.

1716 INHIBITION BY PROPRANOLOL OF BILE ACID STIMULATION OF RABBIT COLONIC ADENYLATE CYCLASE IN VITRO.

(Eng.) Coyne, M. J.; Bonorris, G. G.; Chung, A.; Conley, D. R.; Croke, J.; Schoenfield, L. J. (Cedars-Sinai Medical Center, Los Angeles, CA 90048). *Gastroenterology* 71(1):68-71; 1976.

The *in vitro* effect of bile acids (deoxycholic acid and taurocholic acid), NaF, catecholamines (epinephrine and norepinephrine), and propranolol on adenylate cyclase (AC) activity was determined in rabbit colonic mucosa. NaF (10^{-4} M) increased AC activity to 220% of control ($p<0.01$). Deoxycholic acid (10^{-4} M) increased AC activity to 178% of control ($p<0.01$). Lesser but significant ($p<0.01$) stimulation of AC occurred at both higher and lower concentrations of deoxycholic acid, with no effect at 10^{-10} M. Taurocholic acid (10^{-4} M) and epinephrine and norepinephrine (10^{-2} M, 10^{-4} M, 10^{-6} M, and 10^{-8} M) had no effect on AC. Propranolol (10^{-6} M) caused a 60% decrease ($p<0.01$) in the stimulated AC activity induced by 10^{-4} M deoxycholic acid. Propranolol (10^{-4} M) decreased basal AC by 30% ($p<0.01$). The results indicate that: deoxycholic acid, but not taurocholic acid, epinephrine, or norepinephrine, stimulates colonic AC activity; propranolol inhibits this deoxycholic acid stimulation of AC; and catecholamines are not intermediaries in this action of propranolol on colonic mucosal AC activity.

1717 PROPRANOLOL INHIBITS ADENYLATE CYCLASE AND SECRETION STIMULATED BY DEOXYCHOLIC ACID IN THE RABBIT COLON.

(Eng.) Conley, D.; Coyne, M.; Chung, A.; Bonorris, G.; Schoenfield, L. (Cedars-Sinai Medical Center, Los Angeles, CA 90048). *Gastroenterology* 71(1):72-75; 1976.

The effects of the adenylate cyclase inhibitor, propranolol, on deoxycholic acid (DCA) stimulation of net secretion and on the cyclic AMP system were determined in the colon. In each of 30 New Zealand white rabbits, 6 mM and 8 mM DCA were injected in random sequence into three colonic loops *in situ*. Propranolol (4 mg/kg) was administered i.v. to 12 of the 30 rabbits 1/2 hr before preparation of the loops, i.e., 5 1/2 hr before the rabbits were killed. In the 18 untreated animals, 6 and 8 mM DCA significantly stimulated colonic net secretion and mucosal adenylate cyclase activity; 6 mM DCA caused no change in mucosal phosphodiesterase activity, whereas 8 mM DCA caused a 25% decrease ($p<0.01$). In propranolol-treated animals compared to untreated animals, the volume of luminal fluid in controls was not different; with 6 mM DCA it was 88% less ($p<0.01$), and with 8 mM DCA it was 45% less ($p<0.01$); adenylate cyclase activity in controls was 43% less ($p<0.01$), with 6 mM DCA it was 67% less ($p<0.01$), and with 8 mM DCA it was 65% less ($p<0.01$); phosphodiesterase activity in controls and with 6 mM DCA was not different, and with 8 mM DCA, it was 38% greater ($p<0.02$). It is concluded that propranolol prevents DCA stimulation of colonic net secretion, and it inhibits the cyclic AMP system. Propranolol, therefore, warrants investigation as therapy for diarrhea caused by bile acids in the colon.

1718 INHIBITION OF ENTEROTOXIN-INDUCED INTESTINAL SECRETION BY THE POLYPEPTIDE ANTIBIOTIC, POLYMYXIN.

(Eng.) Maimon, H. N.; Mitch, W. E.; Banwell, J. G.; Hendrix, T. R. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD). *Johns Hopkins Med. J.* 138(3):82-90; 1976.

The effects of polymyxin on the interaction between cholera enterotoxin (CT) and intestinal mucosa, and its inhibitory influence on intestinal fluid secretion, caused by *Escherichia coli* enterotoxin, were studied. Rabbit jejunal loops were exposed to 1 mM polymyxin sulfate for 30 min prior to CT exposure and recirculatory perfusion with an isotonic electrolyte solution for 6 hr. After 3 hr, net fluid secretion into the lumen was decreased 96% by polymyxin pretreatment, compared to loops exposed to cholera toxin alone. Net fluid secretion in polymyxin pretreated, CT exposed loops gradually developed, although 78% inhibition could be maintained throughout the 6-hr study when polymyxin was included in the electrolyte perfusate. Progressive loss of ^{3}H-polymyxin occurred from villi and crypt fractions and its concentration increased in the perfusate, indicating that secretion resumed when polymyxin concentration at the mucosal surface declined. Polymyxin inhibition of CT secretion was not observed unless mucosa was pre-exposed to the antibiotic. Polymyxin inhibited the intestinal secretory response to *E. coli* enterotoxin, as well as CT; ganglioside, a phospholipid, which specifically deactivates CT, only inhibited CT-induced secretion.

1719 PREVENTION AND REVERSAL OF CHOLERA ENTEROTOXIN-INDUCED INTESTINAL SECRETION BY METHYLPREDNISOLONE INDUCTION OF Na^+-K^+-ATPase. (Eng.) Charney, A. N.; Donowitz, M. (Walter Reed Army Medical Center, Washington, DC 20012). *J. Clin. Invest.* 57(6):1590-1599; 1976.

The relation of the mucosal enzyme systems Na^+-K^+-activated adenosine triphosphatase (Na-K-ATPase) and adenylate cyclase and their associated intestinal transport processes was studied in the Walter Reed rat ileum. Two ileal loops were constructed in each anesthetized rat; one loop was inoculated with saline, the other loop with cholera enterotoxin dissolved in saline (choleragen). Net transport of water and electrolytes was measured *in vivo* and enzyme activity was measured in the mucosa of the perfused loops. All doses of choleragen between 5-150 μg decreased water movement as early as 3.5 hr after inoculation. A linear relationship between the dose of choleragen and the level of net water and electrolyte secretion was observed when choleragen doses between 5-150 μg were incubated in ileal loops for 4 hr. Adenylate cyclase activity was always increased in secreting intestinal loops, whereas Na-K-ATPase was unaffected by choleragen. In animals pretreated with methylprednisolone acetate (3 mg/100 g/day, s.c.) for 3 days before loop inoculation, saline loops enhanced mucosal Na-K-ATPase activity and increased net water and electrolyte absorption; choleragen-exposed loops increased adenylate cyclase and Na-K-ATPase activities and net absorption of water and electrolytes 4 hr after inoculation. These effects of methylprednisolone acetate were still present 19.5 hr after inoculation. When a single injection of methylprednisolone acetate was given 3.5 hr after choleragen inoculation, both adenylate cyclase and Na-K-ATPase were activated, and net intestinal absorption of water and electrolytes was observed 19.5 hr after inoculation. These results suggest that methylprednisolone can prevent and reverse the secretory effects of choleragen by selectively stimulating a coexisting absorptive process.

1720 PROSTAGLANDIN E_2: A FACTOR IN THE PATHOGENESIS OF CHOLERA. (Eng.) Tothill, A. (Middlesex Hosp. Medical Sch., Windeyer Building, Cleveland St., London W1P 7PN, England). *Prostaglandins* 11(6):925-934; 1976.

The role of prostaglandin E_2 in the pathogenesis of cholera was investigated. Injection of cholera toxin *in vivo* into loops of Sprague-Dawley rat intestine caused the production of an exudate. An assay on the rat stomach strip and thin-layer chromatography revealed the presence of prostaglandin E_2. The amounts ranged from 20-40 ng/loop of intestine. Introduction of 30 ng of prostaglandin E_2 into intestinal loops caused the production of an exudate similar in volume to that found after the introduction of cholera toxin. These results indicate that the exudate in cholera is caused by the action of prostaglandin liberated by the enterotoxin. It is suggested that an inhibitor of prostaglandin release be added to the solutions used in treatment for the restoration of fluids and electrolytes, to block the action of toxin still present in the intestinal lumen, thereby achieving a more rapid therapeutic result.

1721 ALCOHOL AND ABSORPTION FROM THE SMALL INTESTINE. 2. EFFECT OF ETHANOL ON ATP AND ATPase ACTIVITIES IN GUINEA-PIG JEJUNUM. (Eng.) Krasner, N.; Carmichael, H. A.; Russell, R. I.; Thompson, G. G.; Cochran, K. M. (Stobhill General Hosp., Glasgow, Scotland). *Gut* 17(4):249-251; 1976.

The effects of the acute and chronic administration of ethanol on ATP levels and adenosine triphosphatas (ATPase) activities were studied in the guinea pig jejunum. The exposure of isolated segments of jejunum to 2% ethanol, for 1 hr, caused a significan reduction ($p<0.001$) in the ATP content, when compared with levels found in segments perfused with Krebs' solution. However, no alteration was noted in the activity of ATPase. The chronic administration of 50% ethanol in a dose of 2·5 g/kg for 2 weeks did not affect either the ATP centent or ATPas activity in jejunal mucosa. It is suggested that intestinal dysfunction in alcoholics is probably a direct effect of recent ethanol ingestion.

1722 INFLUENCE OF CERTAIN INDIGENOUS GASTROINTESTINAL MICROORGANISMS ON DUODENAL ALKALINE PHOSPHATASE IN MICE. (Eng.) Yolton, D. P.; Savage, D. C. (2010 Laurel St., Forest Grove, OR 97116). *Appl. Environ. Microbiol.* 31(6):880-888; 1976.

Mechanisms by which indigenous microbiota influence alkaline phosphatase activity were investigated in duodenal homogenates or extracts from adult specific pathogen-free (SPF) and germfree mice and in gnotobiotic mice mono-associated with a *Lactobacillus* sp., a *Bacteroides* sp., or a coliform strain indigenous to SPF mice. Activity levels of the enzyme were much higher in the preparations from germfree mice than in those from the SPF controls. In the gnotobiotes mono-associated either with a freshl isolated *Lactobacillus* sp. or a *Bacteroides* sp., the levels of alkaline phosphatase activity were intermediate between the values for germfree and SPF mice. In the gnotobiotes mono-associated with a coliform strain, alkaline phosphatase activity remained at high germfree levels. Butanol extracts of duodenal tissue from SPF mice, germfree mice, and ex-germfree mice, associated with an indigenous microflora from SPF mice (conventionalized), were subjected to acrylamide gel electrophoresis. A stain for alkaline phosphatase activity revealed three major bands in the gels prepared with extracts from SPF and conventionalized mice, but only two in the gels prepared with extracts from germfree mice. All three bands may have been present in the latter gels. One of the bands (the middle one) may have been obscured, however, by high activity in the slowest moving band. As determined by densitometric scanning, the slowest moving band had much higher activity in the preparations from germfree animals than in those from SPF or conventionalized mice. These findings suggest that the indigenous microbial flora affects, both quantitatively, and qualitatively, the activity of alkaline phosphatases in the mouse intestinal mucosa.

1723 THE FUNCTIONAL RESPONSE OF THE DOG ILEUM TO ONE HOUR'S ISCHAEMIA.

(Eng.) Robinson, J. W. L.; Menge, H.; Sepulveda, F. V.; Cobo, F.; Mirkovitch, V. (Hopital Cantonal Universitaire, CH-1011 Lausanne, Switzerland). *Clin. Sci. Mol. Med.* 50(2):115-122; 1976.

The absorptive capacity of the ischemic intestine of the dog was studied simultaneously *in vivo* and *in vitro*; in addition, the regenerating epithelium was studied morphometrically and histochemically. A loop of ileum, approximately 40 cm above the cecum, was subjected to arterial ischemia for 1 hr, and the afferent artery and the intestinal wall at each end of the loop were clamped; the efferent vein was left open, and nothing was introduced into the lumen. The function and structure of the ileal mucosa were examined immediately after arterial ischemia and 1, 3, or 7 days after the trauma. Immediately after the ischemia, there was a net movement of water and ions into a luminal perfusate *in vivo*. One day later, there was no net movement of water and electrolytes, but net absorption returned on the third day. Active transport of phenylalanine or β-methylglucoside by mucosal strips *in vitro* was abolished immediately after the trauma, but it was largely restored 1 day later. There was a close correlation between glucose absorption *in vivo* and β-methylglucoside uptake *in vitro*. Morphological study revealed pronounced desquamation of enterocytes immediately after the trauma. The regenerating mucosa had shorter villi and crypts and lower enzyme activities, assessed histochemically 1 day later. Most parameters returned to normal by the third postoperative day.

1724 THE UTILIZATION OF GLUCOSE AND PRODUCTION OF LACTATE BY IN VITRO PREPARATIONS OF RAT SMALL INTESTINE: EFFECTS OF VASCULAR PERFUSION.

(Eng.) Hanson, P. J.; Parsons, D. S. (Dept. Biochemistry, Univ. Oxford, Oxford, England). *J. Physiol. (London)* 255(3):775-795; 1976.

The metabolism rate of glucose to lactate was measured in a number of nonvascularly perfused preparations of rat jejunum *in vitro*. The glucose and lactate metabolism were measured simultaneously and under conditions such that the uptake of glucose and the appearance of lactate were linearly related to time. There was no difference between the rates at which rings of rat jejunum utilized glucose during the first 45 min of anaerobic or aerobic incubation. During the first 15 min of incubation, 60-70% of the metabolized glucose was converted to lactate under aerobic conditions; this value increased to 80-90% during the subsequent 30 min. During this same period, lactate production was higher under anaerobic than under aerobic conditions, but after this initial period, the rate of lactate production was the same under both conditions. For segments of rat jejunum, maintained *in vitro* by the recirculation of nutrient fluid through the intestinal lumen, neither the rate of production of lactate, nor the utilization of glucose, was stimulated if the preparation was maintained under anaerobic conditions. The direct delivery of gas (in a stream of bubbles) into the intestinal lumen (segmented circulation) reduced both the utilization of glucose and the production of lactate under aerobic conditions. However, no effect on glucose metabolism was observed under anaerobic conditions. The finding of a Pasteur effect with the segmented-circulated preparation, but not with the simple recirculated preparation, is associated with the lower rate of aerobic lactate production in the former preparation It is suggested that under conditions of segmented circulation, the luminal compartment is better stirred, thereby increasing access of O_2 to the tissue.

1725 A STUDY OF THE 5-HYDROXYTRYPTAMINE DISTRIBUTION IN ENTEROCHROMAFFIN CELL GRANULES USING ANALYTICAL ELECTRON MICROSCOPY.

(Eng.) Marberger, K.; Wood, J. (Univ. Texas Health Science Center, Houston, TX 77025). *Cytobios* 13(50/51):79-85; 1975.

1726 REDUCTION OF SULPHONATED WATER-SOLUBLE AZO DYES BY CAECAL MICROORGANISMS FROM THE RAT.

(Eng.) Larsen, J. C.; Meyer, T.; Scheline, R. R. (Dept. Pharmacology, Univ. Bergen, Bergen, Norway). *Acta Pharmacol Toxicol.* 38(4):353-357; 1976.

1727 ENDOGENOUS ACETYLCHOLINE RELEASE AND LABELLED ACETYLCHOLINE FORMATION FROM (^{3}H) CHOLINE IN THE MYENTERIC PLEXUS OF THE GUINEA-PIG ILEUM.

(Eng.) Szerb, J. C. (Dept. Physiology, Dalhousie Univ., Halifax, Nova Scotia B3H 4H7). *Can. J. Physiol. Pharmacol.* 53(4):566-574; 1975.

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1728 CHARACTERIZATION OF A HUMAN INTESTINAL FUCOLIPID WITH BLOOD GROUP Le^a ACTIVITY. (Eng.) Smith, E. L.; McKibbin, J. M. (Dept. Biochem., Univ. Alabama, Birmingham, AL 35294). *J. Biol. Chem.* 250(15):6059-6064; 1975.

1729 FIBRE IN NUTRITION. (Eng.) Southgate, D. A. T. (Dunn Nutritional Lab., Milton Road, Cambridge CB4 1XJ, England). *Bibl. Nutr. Dieta* (22):109-124; 1975.

1730 RECEPTOR BINDING AND PHARMACOLOGICAL ACTIVITY OF OPIATES IN THE GUINEA-PIG INTESTINE. (Eng.) Creese, I.; Snyder, S. H. (Johns Hopkins Sch. Medicine, Baltimore, MD 21205). *J. Pharmacol. Exp. Ther.* 194(1):205-219; 1975.

1731 THE ASSAY OF DIPEPTIDES USING FLUORESCAMINE AND ITS APPLICATION TO DETERMINING DIPEPTIDASE ACTIVITY. (Eng.) Perrett, D.; Webb, J. P. W.; Silk, D. B. A.; (St. Bartholomew's Hosp., London, England). *Anal. Biochem.* 68(1):161-166; 1975.

1732 COMPARISON OF PROPERTIES OF HUMAN INTESTINAL AND PLACENTAL ALKALINE PHOSPHATASE. (Eng.) Sugiura, M.; Isobe, M.; Hirano, K.; Iino, S.; Suzuki, H.; Oda, T. (Tokyo Coll. Pharmacy, Ueno-sakuragi, 1-chome, Taito-ku, Tokyo, 110, Japan). *Chem. Pharm. Bull. (Tokyo)* 23(7):1542-1546; 1975.

1733 PURIFICATION OF HUMAN INTESTINAL ALKALINE PHOSPHATASE. (Eng.) Sugiura, M.; Isobe, M.; Hirano, K.; Iino, S.; Suzuki, H.; Oda, T. (Tokyo Coll. Pharmacy, Ueno-sakuragi, 1-chome, Taito-ku, Tokyo, 110, Japan). *Chem. Pharm. Bull. (Tokyo)* 23(7):1537-1541; 1975.

1734 EFFECTS OF Clostridium perfringens ENTEROTOXIN ON METABOLIC INDEXES OF EVERTED RAT ILEAL SACS. (Eng.) McDonel, J. L.; Duncan, C. L. (Dept. Bacteriology, Univ. Wisconsin, Madison, WI 53703). *Infect. Immun.* 12(2):274-280; 1975.

1735 COMPARISON BETWEEN NARCOTIC "RECEPTORS" IN THE GUINEA-PIG ILEUM AND THE RAT BRAIN. (Eng.) Terenius, L. (Dept. Medical Pharmacology, Univ. Uppsala, Box 573, S-751 23 Uppsala, Sweden). *Acta Pharmacol. Toxicol.* 37(3):211-221; 1975.

1736 INCREASED INTESTINAL CHROMATIN TEMPLATE ACTIVITY: INFLUENCE OF 1α,25-DIHYDROXYVITAMIN D_3 AND HORMONE-RECEPTOR COMPLEXES. (Eng.) Zerwekh, J. E.; Lindell, T. J.; Haussler, M. R. (Coll. Medicine, Univ. Arizona, Tucson, AZ 85724). *J. Biol. Chem.* 251(8):2388-2394; 1976.

1737 INFLUENCE OF VIABLE YOGURT MICROFLORA ON DIGESTION OF LACTOSE BY THE RAT. (Eng.) Goodenough, E. R.; Kleyn, D. H. (Dept. Food Science Rutgers Univ., New Brunswick, NJ 08903). *J. Dairy Sci.* 59(4):601-606; 1976.

1738 COMPARATIVE STUDY OF THE INTERACTIONS OF THE TRYPSIN AND DETERGENT FORM OF THE INTESTINAL AMINOPEPTIDASE WITH LIPOSOMES. (Eng.) Pattus, F.; Verger, R.; Desnuelle, P. (Centre National de la Recherche Scientifique, 31, Chemin J. Aiguier, 13274 Marseille Cedex 2 France). *Biochem. Biophys. Res. Commun.* 69(3):718-723; 1976.

1739 A RAPID AND SIMPLE RADIOASSAY FOR INOSINIC ACID: PYROPHOSPHATE PHOSPHORIBOSYLTRANSFERASE IN THE PRESENCE OF XANTHINE OXIDASE AND VICE VERSA. (Eng.) Yip, L. C.; Balis, M. E. (Memorial Sloan-Kettering Cancer Center, New York, NY 10021). *Anal. Biochem.* 71(1):14-23; 1976.

1740 INFLUENCE OF DIETARY PEROXIDES, SELENIUM AND VITAMIN E ON GLUTATHIONE PEROXIDASE OF THE GASTROINTESTINAL TRACT. (Eng.) Vilas, N. N.; Bell, R. R.; Draper, H. H. (Dept. Food Science, Univ. Illinois, Urbana-Champaign, Urbana, IL 61810). *J. Nutr.* 106(5):589-596; 1976.

1741 VITAMIN D_3 EFFECT ON THE CALCIUM CONTENT IN SUBCELLULAR FRACTIONS OF RAT INTESTINAL MUCOSA. (Eng.) Iitoyo-Sugisaki, N.; Moriuchi, S.; Hosoya, N. (Sch. Health Sciences, Univ. Tokyo, Bunkyo-ku, Tokyo 113, Japan). *J. Nutr. Sci. Vitaminol.* 21(3):235-236; 1975.

See also, 1552, 1566, 1571, 1573, 1581, 1629, 1742, 1751, 2030.

GENERAL

1742 THE SIZE, pH, AND REDOX POTENTIAL OF THE CECUM IN MICE ASSOCIATED WITH VARIOUS MICROBIAL FLORAS. (Eng.) Celesk, R. A.; Asano, T.; Wagner, M. (Dept. Microbiology, Univ. Notre Dame, Notre Dame, IN 46556). *Proc. Soc. Exp. Biol. Med.* 151(2):260-263; 1976.

Cecal size, cecal *in situ* redox potential (Eh), and pH of cecal contents were determined in CFW mice. The animals were treated either conventionally or under a variety of gnotobiotic conditions, including germfree, mono-associated with a cecal *Clostridium* species, hexaflora-associated, and thermoduric polyflora-associated. The mean Eh was approximately +200 mV in germfree mice and -200 mV in the conventional mice. The Eh was close to zero in the mono-associated mice, thus occupying an intermediate position between the germfree and conventional mice. The potentials observed in the hexaflora and the thermoduric flora groups were indistinguishable from those of conventional animals. The degree of normalization was more advanced with respect to the redox potential than to the cecal size in the various gnotobiotic groups. In the thermoduric polyflora-associated group, normalization was observed in both cecal size and redox potential. This demonstrates that normalization can be accomplished with a relatively simplified microflora.

1743 EVIDENCE FOR A COLON CHALONE. (Eng.)

Houck, J. C.; Kanagalingam, K.; Kaufman, S. L.; Sunshine, G. (Res. Foundation Children's Hosp., Washington, DC 20009). *J. Natl. Cancer Inst.* 56(5):899-902; 1976.

The concept that a specific and endogenous mitotic inhibitor controls cellular proliferation was tested *in vitro* in human colon carcinoma cells (SW-48). The molecular weight fractions of 10,000-50,000 daltons prepared from "used" medium (obtained during cultivation of SW-48 cells) inhibited the proliferation and DNA synthesis of these cells. Fractions exceeding 50,000 daltons were not inhibitory; those less than 10,000 daltons were cytotoxic. The inhibitory fraction did not affect either proliferation of human fibroblasts or transformation of human lymphocytes *in vitro*. Similar fractions from the colon mucosa of humans and other species inhibited the proliferation of SW-48 cells (humans, 95%; pigs, 83%; and dogs, 64% inhibition), whereas extracts of dog jejunum or lung did not. This mitotic inhibition was completely reversible and could be destroyed by preincubation with trypsin. Therefore, colon cells appear to contain a cell- (but not species-) specific, endogenous mitotic inhibitor or chalone.

1744 CYTOTOXIC EFFECTOR CELL FUNCTION IN ORGANIZED GUT-ASSOCIATED LYMPHOID TISSUE (GALT). (Eng.)

Nelson, D. L.; Bundy, B. M.; Blaese, R. M.; Strober, W. (Building 10, Room 4N114, Natl. Inst. Health, Bethesda, MD 20014). *Cell. Immunol.* 22(1):165-175; 1976.

Lymphocytes from the organized gut-associated lymphoid tissues (GALT) of adult guinea pigs were examined for surface markers characteristic of thymus-derived (T) and bone-marrow-derived (B) lymphocytes. In addition, their capacity to function as effector cells in mitogen-induced cellular cytotoxicity (MICC) and antibody-dependent cellular cytotoxicity (ADCC) reactions was investigated. GALT lymphocytes formed rosettes with rabbit RBC, a T-cell marker, and underwent proliferative responses *in vitro* in the presence of phytohemagglutinin (PHA), concanavalin A (Con A), and pokeweed mitogen (PWM). GALT lymphocytes were cytotoxic *in vitro* for RBC and DBA mastocytoma targets in the presence of PHA. A population of GALT lymphocytes bound aggregated γ-globulin; however, they functioned poorly in ADCC reactions. Thus, organized GALT in the guinea pig contains lymphocytes capable of functioning in T-cell-dependent MICC reactions but either lacks the effector cell population that mediates ADCC or contains an effector cell that functions poorly in ADCC.

1745 GIARDIASIS IN THE MOUSE: AN ANIMAL MODEL.

(Eng.) Roberts-Thomson, I. C.; Stevens, D. P.; Mahmoud, A. A. F.; Warren, K. S. (Case Western Reserve Hosp., Cleveland, OH 44106). *Gastroenterology* 71(1):57-61; 1976.

An animal model for giardiasis was developed using *Giardia muris* in female Swiss albino mice. Intraesophageal inoculation of *G. muris* cysts caused a reproducible pattern of infection, with trophozoite and cyst counts reaching a maximum on days 5 to 14 after cyst inoculation and thereafter showing a progressive decline. Spontaneous resolution of infection occurred in most mice after 21-28 days. When compared to uninfected controls, Giardia-infected mice had significant impairment of weight gain and a significant reduction in the villus to crypt ratio of jejunal mucosa. Although maximal trophozoite and cyst counts were independent of the size of the cyst inoculum, those mice receiving inoculations of larger numbers of cysts (1,000 or 10,000) showed earlier attainment of maximal counts, greater impairment of weight gain, and earlier and more severe small bowel changes than mice receiving inoculations of smaller numbers of cysts (100). This model offers opportunities for study of this poorly understood gastrointestinal parasite.

1746 AN ANIMAL MODEL OF FULMINANT HEPATIC FAILURE: A FEASIBILITY STUDY. (Eng.)

Miller, D. J.; Hickman, R.; Fratter, R.; Terblanche, J.; Saunders, S. J. (Dept. Medicine, Univ. Cape Town, Cape Town, South Africa). *Gastroenterology* 71(1):109-113; 1976.

An attempt was made to produce an animal model of fulminant hepatic failure in the pig by intragastric administration of acetaminophen (*N*-acetyl-*p*-aminophenol). The effect of varying doses (1.0-4 g/kg) was observed in phenobarbital-pretreated (45 mg/kg, i.m. for 3 days) and in untreated animals. Assessment of optimal dose was made in terms of duration of survival and coma in animals exhibiting biochemical and histological evidence of liver necrosis. Significant liver necrosis was observed in enzyme-induced pigs only, whereas in the noninduced pigs,

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respiratory arrest was considered a likely cause of death. Although liver necrosis occurred consistently at a dose of 0.5 to 1.1 g/kg of acetaminophen in phenobarbital-pretreated animals, survival time and coma duration were unpredictable. Only 20% of the total number of phenobarbital-pretreated pigs administered acetaminophen in this dose range fulfilled the prescribed criteria for a satisfactory model. There was a good correlation between survival time and duration of coma, although survival time did not correlate with acetaminophen dose, peak plasma acetaminophen levels, thrombocytopenia, fall in hematocrit or fibrinogen, or alteration in other biochemical parameters. In addition to the unpredictable duration of survival and coma, the occurrence of acute anemia in 60% of the enzyme-induced animals detracted from the possible usefulness of this model to evaluate various therapeutic regimes.

1747 A STUDY OF THE PHYSICOCHEMICAL INTERACTIONS BETWEEN BILIARY LIPIDS AND CHLORPROMAZINE HYDROCHLORIDE: BILE-SALT PRECIPITATION AS A MECHANISM OF PHENOTHIAZINE-INDUCED BILE SECRETORY FAILURE.

(Eng.) Carey, M. C.; Hirom, P. C.; Small, D. M. (Peter Bent Brigham Hosp., 721 Huntington Ave., Boston, MA 02115). *Biochem. J.* 153(3):519-531; 1976.

The physicochemical interactions of chlorpromazine hydrochloride [2-chloro-10-(3-dimethylaminopropyl)-phenothiazine hydrochloride] with the major components of bile were studied *in vitro* to determine its relation to bile secretory failure in man. Bile salts in concentrations above their critical micellar concentrations were precipitated from solution by chlorpromazine hydrochloride as insoluble 1:1 salt complexes. In the case of mixed bile salt/phosphatidylcholine micellar solutions, however, the degree of precipitation was inhibited by the phospholipid in proportion to its mole fraction. With increases in the concentration of chlorpromazine hydrochloride or bile salt, micellar solubilization of the precipitated complexes resulted. Sonicated dispersions of the negatively charged phospholipid phosphatidylserine were also precipitated, but dispersions of the zwitterionic phospholipid phosphatidylcholine were not. Chlorpromazine hydrochloride efficiently solubilized these membrane phospholipids as mixed micellar solutions when the drug:phospholipid molar ratio reached 4:1. Polarizing microscopy and x-ray diffraction studies revealed that the precipitated complexes were amorphous, and potentiometric studies confirmed the presence of a salt bond. Some dissociation of the complex occurred in the case of the most polar bile salt (K_s=0.365). As canalicular bile salt secretion determines much of bile-water flow, it is proposed that complexing and precipitating of bile salts by chlorpromazine hydrochloride and its metabolites may be physicochemically related to the reversible bile secretory failure produced by this drug.

1748 TOTAL AND PARTIAL ANOXIA OF THE LIVER: AN ATTEMPT TO CREATE PROTRACTED LIVER FAILURE IN THE PIG.

(Eng.) Tonnesen, K. (Rigshospi talet, Copenhagen, Denmark). *Scand. J. Gastroenter* 11(Suppl. 37):27-31; 1976.

Pig livers were exposed to partial or total anoxia for various periods in an attempt to produce severe, but non-lethal experimental liver failure. Group I (3 animals) was exposed to total anoxia for 30 min, group II (3 animals) for 50 min, group III (4 animal for 60 min, and group IV (3 animals) for 75 min. In group V (10 animals) a subtotal devascularization was performed. In groups I and II, all animals survived the period of observation (1 week). In gro III half of the animals, and in group IV (3) all of the animals died within 24 hr. In group V (10), 5 of the animals died with a mean survival time of 2 1/2 hr. The animals surviving the period of observa tion did show changes in the routine liver tests, bu none of them showed clinical signs of liver insufficiency. This indicates that the differences between lethal and clinically insignificant liver damage is very small. It is concluded that the pig liver can tolerate 50 min of total anoxia and recover almost completely after 1 week, and that a period of anoxia or subtotal devascularization does not create protracted liver failure.

1749 EFFECTS OF VASOCONSTRICTORS ON INTESTINAL VASCULAR RESISTANCE AND OXYGEN EXTRACTION.

(Eng.) Shepherd, A. P.; Pawlik, W.; Mailman, D.; Burks, T. F.; Jacobson, E. D. (Univ. Texas Health Science Center, Houston, TX 77025). *Am. J. Physiol.* 230(2):298-305; 1976.

The effects of vasoconstrictors on arteriovenous oxygen difference and on vascular resistance were measured in isolated constant-flow perfused canine small bowel to delineate the mechanism through which vasoactive compounds alter intestinal oxygen consumption and to determine the pharmacological nature of the involved receptors. Norepinephrine (NE, 0.6 μg/ml) and sympathetic stimulation (SS, 10 Hz) increased vascular resistance and depressed O_2 extraction. These effects were not altered by β-blockade, but were abolished by α-blockade. Since capillary filtration coefficients at constant-pressure perfusion and ^{86}Rb extraction at constant flow are reported to diminish during NE and SS, it follows that these agents reduce O_2 extraction by an α-adrenergic closure of precapillary sphincters. Vaso pressin (0.025 μg/ml) had similar effects, which were not affected by adrenergic blocking agents. Epinephrine (Epi), in high doses (0.9 μg/ml) or after propranolol, produced the same effects as NE and SS. By contrast, Epi in low doses (0.5 μg/ml) increased O_2 and ^{86}Rb extraction. This response to low doses of Epi was not affected by phentolamine, but it was reversed by propranolol. It is concluded that Epi in high doses or after propranolol depresses intestinal O_2 extraction by the same mechanism as NE and SS, but the mechanism through which Epi increases intestinal O_2 extraction in unclear.

1750 PANCREATIC, GALLBLADDER, AND GASTRIC RESPONSES TO INTRADUODENAL CALCIUM PERFUSION IN MAN. (Eng.) Holtermuller, K. H.; Malagelada, J.-R.; McCall, J. T.; Go, V. L. W. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *Gastroenterology* 70(5):693-696; 1976.

The effect of intraduodenal calcium on pancreatic, gallbladder, and gastric functions was studied in 26 healthy male volunteers using a validated perfusion method to quantify total pancreatic, biliary, and gastric outputs during duodenal perfusion of either 6 mM, 12 mM, or 25 mM of elemental calcium (as isotonic calcium chloride solutions). Intraluminal calcium, 6 mM, significantly stimulated pancreatic trypsin output above basal rates, but had no effect on bilirubin output. Increasing calcium concentration to 12 mM and 25 mM, resulted in a significant increase in bilirubin output above basal levels, reflecting gallbladder emptying and contraction. The effect was similar to that achieved with an i.v. dose of cholecystokinin-pancreozymin (CCK-PZ) that produced "maximal" gallbladder contraction and pancreatic enzyme outputs. Responses to calcium were reproducible when repeated in the same individual. Gastric acid outputs and serum gastrin levels increased significantly only with higher calcium perfusions (25 mM). Although duodenal calcium perfusion (25 mM) slightly increased serum calcium concentrations, induced hypercalcemia (by i.v. calcium infusion) of similar magnitude had no effect on pancreatic or gallbladder function. It is suggested that intraduodenal calcium may induce release of CCK-PZ (and/or other neurohormonal factors) from the gut, causing stimulation of these digestive organs.

1751 RAT GASTRIC MUCOSAL OXYGEN TENSION, ULCER INDEX, PLASMA GASTRIN AND GLUCAGON FOLLOWING RESTRAINT STRESS. INFLUENCE OF VAGOTOMY, SPLANCHNICOTOMY AND EXOGENOUS SECRETIN. (Eng.) Schwille, P. O.; Schellerer, W.; Steiner, H.; Reitzenstein, M. (Chirurgische Universitatsklinik Mineralstoffwechsel- und Hormonlabor, Maximiliansplatz, D-8520 Erlangen, W. Germany). *Res. Exp. Med.* 167(2):149-158; 1976.

The effect of prior vagotomy, splanchnicotomy, or secretin administration on preserving intact gastric microcirculation (partial oxygen tension of gastric mucosa, pO_2) and on the ulcer index (UI) during stress was studied in male SPF Wistar rats. Stress ulceration was produced by restraint. Secretin was administered either during stress (5 times, 1, 2, 4, 5, 16 U/kg) or following the termination of the stress procedure (5 times, 4 or 8 U/kg). Truncal vagotomy, with and without pyloroplasty, or splanchnicotomy was performed 6-7 days prior to stress, in some animals. Neither prior truncal vagotomy, splanchnicotomy, nor combined dissection of abdominal autonomic nerves were effective in preventing the stress mediated fall of mucosal pO_2 and the rise in plasma glucagon. The UI remained elevated and gastrin was unchanged. Prophylactic injection of increasing doses of secretin maintained microcirculation at subnormal pO_2 levels for unstressed animals (V_{max} 15.53 mm Hg; K_m 0.99 U/kg), but simultaneously brought about a continuous rise in serum gastrin. Up to 8 U/kg, plasma glucagon was higher than in saline control groups, reaching a peak value with 2 U/kg when the UI showed its nadir. Following termination of stress, secretin therapy markedly improved both mucosal pO_2 and UI. It is suggested that breakdown of gastric microcirculation may not be solely responsible for stress ulcer development.

1752 FUNCTIONAL AND BIOCHEMICAL EVIDENCE OF DAMAGE TO ENTEROCYTES INDUCED BY TRIPARANOL: ROLE OF LYSOSOMES AND THE EFFECT OF A GLUTEN-FREE DIET. (Eng.) Soule, J.-C.; Neale, G.; Peters, T. J. (Royal Postgraduate Medical Sch., Du Cane Rd., London W12 OHS, England). *Clin. Sci. Mol. Med.* 51 (1):19-25; 1976.

Functional and biochemical studies were performed on the small intestine of male Wistar rats given 0.114 mmol/kg of triparanol daily for 10 days, and the results were compared with those obtained in controls. The animals given triparanol were fed either standard rat food or a gluten-free diet. By using a recirculating-perfusion technique *in vivo*, it was shown that absorption of galactose from an 8 mM solution was impaired in the ileum but not in the jejunum of the triparanol-treated rats. Assays of marker enzymes for the principal subcellular organelles were performed on isolated jejunal and ileal enterocytes. In the ileum, there was a striking decrease in lysosomal enzyme activities and a smaller but significant decrease of lactate dehydrogenase, catalase, and malate dehydrogenase activities. In the jejunum, there was no significant change in the activities of these enzymes. Measurements of lysosomal integrity indicated that ileal lysosomal fragility was markedly increased and that jejunal lysosomes were affected to a much smaller extent. The results support the suggestion that triparanol causes damage by a mechanism similar to that operating in lysosomal storage diseases; this damage was not ameliorated by a gluten-free diet.

1753 HUMAN GASTRIC AND INTESTINAL RESPONSE TO MEALS: GENERAL DISCUSSION. (Eng.) Lagerlof, H. O.; Johansson, C. (No affiliation given). *Mt. Sinai J. Med.* 43:84-98; 1976.

1754 DISTRIBUTION OF DISACCHARIDASES, ALKALINE PHOSPHATASE, AND SOME INTRACELLULAR ENZYMES ALONG THE HUMAN SMALL INTESTINE. (Eng.) Asp, N.-G.; Gudmand-Hoyer, E.; Andersen, B.; Berg, N.-O.; Dahlqvist, A. (Dept. Nutrition, Univ. Lund, Lund, Sweden). *Scand. J. Gastroenterol.* 10(6):647-651; 1975.

1755 COMPOSITION OF THE INTESTINAL MICROFLORA IN HEALTHY INFANTS AT DIFFERENT DATES DURING THE FIRST YEAR OF THEIR LIVES. (Ukr.) Busigi-

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na, N. G.; Snigur, O. I.; Grishchenko, K. M.; Eliseeva, S. I. (Lvov Scientific Res. Inst. Pediatrics, Obstetrics and Gynecology, Lvov, USSR). *Pediatr. Akush. Ginekol.* 37(4):14-15; 1975.

1756 TRANSPLANTATION OF THE INTESTINE IN THE RAT. (Rus.) Kulik, V. P.; Maksimenkova, A. N. (Dept. Normal Anatomy, Patrice Lumumba Univ. Peoples' Friendship, Moscow, USSR). *Eksp. Khir. Anesteziol.* (2):24-27; 1975.

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1759 ULTRA-VIOLET MICROSPECTROPHOTOMETRIC STUDY OF PAROTID GLAND OF RAT. (Jpn.) Katsura, S. (Sch. Medicine, Tokushima Univ., Tokushima, Japan). *Shikoku Acta Med.* 31(2):171-178; 1975.

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1761 EFFECT OF VARYING RATIONS OF FAT AND PROTEIN IN FIBER-FREE SEMISYNTHETIC DIETS ON FECAL OUTPUT OF PIG-TAILED MONKEYS (Macaca nemestrin (Eng.) Spiller, G. A.; Averkin, E.; Bidlack, D. E.; Amen, R. J. (Syntex Res., 3401 Hillview Ave., Palo Alto, CA 94304). *Am. J. Clin. Nutr.* 28(11):1237-1241; 1975.

1762 SUTURABLE GASTROINTESTINAL CANNULAS FOR ANIMALS OF VARIOUS SIZES. (Eng.) Cramer, C. F.; Couch, R. (Dept. Physiology, Univ. British Columbia, Vancouver, Canada, V6T 1W5). *J. Appl. Physiol.* 39(5):846-848; 1975.

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DIAGNOSTIC PROCEDURES

1763 UPPER GASTROINTESTINAL ENDOSCOPY IN THE PEDIATRIC PATIENT. (Eng.) Tedesco, F. J.; Goldstein, P. D.; Gleason, W. A.; Keating, J. P. (Univ. Miami Sch. Medicine, P.O. Box 520875, Biscayne Annex, Miami, FL 33152). *Gastroenterology* 70(4):492-494; 1976.

The safety and effectiveness of performing upper gastrointestinal endoscopy without general anesthesia were evaluated in 50 children ranging in age from 9 months to 16 yr. Preparation of the subject included: (a) fasting for at least 8 hr, (b) administration of atropine sulfate (0.01 mg/kg) and meperidine (0.5-1.0 mg/kg), i.m., 30 min prior to the procedure, (c) use of cetacaine pharyngeal anesthesia, and (d) sedation with Diazepam (5-15 mg, i.v.). The Olympus GIF type D fiberscope was used for most patients over 9 yr of age, and the type P fiberscope was used for all other patients. The esophagus and stomach were visualized in their entirety and the duodenal bulb was entered in 40/46 patients. Of the 24 patients presenting with upper gastrointestinal bleeding, the source was identified by endoscopy in 20, and in 13 patients with either gastric or duodenal ulcers, 11 were diagnosed by endoscopy. The procedure usually required less than 20 min, and it caused no significant complications. Fiberoptic gastrointestinal endoscopy in children is a sensitive and safe diagnostic tool suitable for use without general anesthesia.

1764 EVALUATION OF SPECIFIC VALUE OF ENDOSCOPIC BIOPSIES AND BRUSH CYTOLOGY FOR MALIGNANCIES OF THE OESOPHAGUS AND STOMACH. (Eng.) Witzel, L.; Halter, F.; Gretillat, P. A.; Scheurer, U.; Keller, M. (Gastrointestinal Unit, Univ. Berne, Berne, Switzerland). *Gut* 17(5):375-377; 1976.

The value of multiple biopsies and brush cytology at esophago-gastroscopy was assessed in relation to macroscopic appearance and localization on 100 verified tumors in a prospective study. The cumulative accuracy achieved was 96%; this was significantly better ($p<0.01$) than that of biopsy (83%) and of cytology (85%). While the reliability of both procedures was not significantly different in malignancies of the esophagus, the gastric body, and the antrum, cytology was significantly more accurate in cancers of the cardia (90% and 55% resp., $p<0.05$). Cytology was also more reliable in stenosing tumors (92%/72%, $p<0.05$). In polypoid malignancies, a positive but not significant trend was found in favor of multiple biopsies (94% compared with 64%). One of the two early cancers was only diagnosed by cytology. The results confirm the high diagnostic accuracy of multiple endoscopic biopsies combined with brush cytology and demonstrate the value of cytology in stenosing tumors, especially in those of the cardia.

1765 HEARTBURN: THE ROLE OF RADIOLOGY. (Eng.) Wolf, B. S. (Mount Sinai Sch. Medicine, 5th Ave. and 100th St., New York, NY 10029). *JAMA* 235(12):1244-1247; 1976.

The importance of the radiologic demonstration of a hiatal hernia, reflux, or both, as the explanation of heartburn is discussed. Clinical-radiologic correlation requires additional observations such as the straightness of the potential path for reflux, the presence of a contractile esophagogastric region, the degree of extrinsic compression of the cuff of the stomach within the hiatus, the size of the hernia, and the peristaltic activity of the body of the esophagus. Vigorous or water-swallowing maneuvers to demonstrate reflux are unreliable in individual cases. The so-called patulous cardia, or effaced abdominal esophagus, or widened absent "submerged segment," is a variety of sliding hiatal hernia that is often neglected radiologically but may be of considerable clinical significance.

1766 SPECIFICITY OF ^{99m}Tc-PERTECHNETATE IN SCINTIGRAPHIC DIAGNOSIS OF MECKEL'S DIVERTICULUM: REVIEW OF 100 CASES. (Eng.) Berquist, T. H.; Nolan, N. G.; Stephens, D. H.; Carlson, H. C. (Mayo Clinic, 200 First St. S.W., Rochester, MN 55901). *J. Nucl. Med.* 17(6):465-469; 1976.

The use of abdominal scanning with pertechnetate in the diagnosis of Meckel's diverticulum, was evaluated by reviewing scintigrams and clinical data of 100 patients with suspected Meckel's diverticulum. Of the 100 patients, 33 underwent laparotomy, and Meckel's diverticulum was found in 8 patients. Meckel's diverticulum was correctly identified with pertechnetate scans before operation in seven of these eight cases. There was one false-negative study, in which only a small amount of intact gastric tissue remained in the diverticulum. Negative scans were correctly obtained in patients with arteriovenous malformations, intussusception, and hydronephrosis, all conditions previously suggested as possible causes of false-positive scans. Although this technique has certain limitations, its value as a noninvasive aid in the diagnosis of Meckel's diverticulum has been established.

1767 SERUM LYSOZYME LEVELS IN CROHN'S DISEASE AND ULCERATIVE COLITIS. (Eng.) Peeters, T. L.; Vantrappen, G.; Geboes, K. (Laboratorium voor Gastrointestinale Fysiopathologie, Katholieke Universiteit te Leuven, Leuven B-3000, Belgium). *Gut* 17(4):300-305; 1976.

Serum lysozyme levels were determined in 18 healthy volunteers, in 62 patients with Crohn's disease, and in 30 patients with ulcerative colitis. The mean concentration in Crohn's disease was significantly greater than in the other groups. In patients with Crohn's disease, as well as in patients with ulcerative colitis, the lysozyme levels correlated with the severity of the disease process and with the extent of the lesions; the more severe the disease and the more extensive the involvement, the higher the lysozyme levels. However, the lysozyme values of the different groups overlapped considerably. These results indicate that lysozyme determinations have only limited discriminative value for the diagnosis of Crohn's disease and for determining the severity and the extent of the disease process in the individual patient.

1768 UNUSUAL ROENTGEN MANIFESTATIONS OF LARGE BOWEL CANCER.

(Eng.) Seaman, W. B. (Coll. Physicians and Surgeons, Columbia Univ., 630 W. 168 St., New York, NY 10032). *Semin. Roentgenol.* 11(2):89-99; 1976.

Unusual roentgen manifestations of large bowel cancer are reviewed and illustrated. Calcification in colonic cancers is a rare event, occurring most often in patients under the age of 30. The calcifications are sometimes very opaque and discrete, but are more frequently faint and poorly defined. The correct diagnosis of perforating cancer of the colon is difficult for the radiologist because the roentgen appearance is dominated by the inflammatory component. The extensive pericolic inflammatory reaction produces a long smooth stricture with tapered margins; this is frequently mistaken for inflammatory disease. In others, the mucosal folds are swollen and many have a cobblestone appearance similar to that seen with granulomatous colitis. In cancer of the large bowel, when the neoplasm extends over a long segment, portions of the mucosa may be preserved due to submucosal invasion. Microscopically, these are scirrhous carcinomas. They are frequently undifferentiated and are not of the linitis plastica variety, which has a specific histologic appearance. Radiographically, they simulate an inflammatory process. Carcinoma is the predominant cause of colocolic intussusception in adults. A crescentic filling defect in the colon on barium enema should immediately suggest the diagnosis. If barium enters the lumen of the intussusceptum, the picture of narrow parallel folds surrounded by a stretched coil-like pattern of the intussuscipiens is pathognomonic.

1769 DETERMINATION OF LIVER VOLUME BY THE USE OF A GAMMA CAMERA CONNECTED WITH 1600 OR 4096 CHANNEL ANALYSER IN DIFFUSE LIVER.

(Eng.) Fujii, M.; Mukai, T.; Yamamoto, T.; Wakisaka, G. (Faculty of Medicine, Kyoto Univ., Kyoto, Japan). *Gut* 17(4):289-294; 1976.

A method of *in vivo* calculation of liver volume, using a gamma camera and a 1600 or 4096 channel analyzer, is described. Topographically, the maximum thickness, giving the highest counts in matrix data in the right anterior oblique projection, was measured as the maximum breadth in the right posterior oblique projection. Then the total counts given by the liver were transformed to the volume. Information obtained by the use of ^{198}Au-colloid at necropsy from 13 autopsies indicated that the errors were between -11.9 to +14.7%. In 20 normal control subjects, the mean of measured liver volumes was 779 ± 99 cm^3/m^2 of surface area. The volumetric calculation using ^{99m}Tc-Sn-colloid or ^{99m}Tc-phytate was compared with ^{198}Au-colloid in the same patients. The results wit ^{99m}Tc-Sn-colloid were well correlated with those wit ^{198}Au-colloid, but the results with ^{99m}Tc-phytate an ^{198}Au-colloid were almost equal. It is concluded th liver volume can be measured with reasonable accurac except in rare severe cases of liver cirrhosis.

1770 EFFECT OF VASOPRESSIN ON REGIONAL SPLANCHNIC BLOOD FLOWS IN CONSCIOUS MAN.

(Eng.) Erwald, R.; Wiechel, K. L.; Strandell, T. (Sodersjukhuset, Stockholm, Sweden). *Acta Chir. Scand.* 142(1):36-42; 1976.

The effect of a continuous i.v. infusion of lysine-8-vasopressin, (5 IU/70 kg/20 min) on the portal and the hepatic venous blood flow was studied in 11 conscious normovolemic patients with acute or chronic pancreatitis. The study was performed using multiple portal catheters, oxygen saturation measurements, and an indicator dilution technique with continuous infusion of ^{133}Xe into the portal vein or its tributaries. During vasopressin infusion, the total hepatic blood flow, estimated using indocyanine green dye, was reduced to 61% of the value at rest. The reduction in the portal venous blood flow during vasopressin infusion was more marked than the decrease of the total hepatic flow, corresponding to a calculated increase of the hepatic arterial flow of 50%. Total splanchnic oxygen uptake and extrahepatic splanchnic oxygen uptake were unchanged during and after infusion of vasopressin. Thus, changes in splanchnic blood flow were estimated from changes in arteriovenous oxygen differences. Also, a more pronounced reduction in the portal venous than of the hepatic venous blood flow was observed. The decrease during vasopressin infusion of the superior mesenteric venous flow was more marked than that of the splenic vein. The splanchnic circulatory changes may be different for other doses of vasopressin and in cirrhotic patients with higher hepatic arterial blood flow fractions.

1771 UTILIZATION OF THE QUANTITATIVE ASSAY OF LIPOPROTEIN X IN THE DIFFERENTIAL DIAGNOSIS OF EXTRAHEPATIC OBSTRUCTIVE JAUNDICE AND INTRAHEPATIC DISEASES.

(Eng.) Magnani, H. N.; Alaupovic, P. (Medical Sch., Univ. Birmingham, Birmingham B15 2TG, England). *Gastroenterology* 71(1):87-93; 1976.

Quantitative determination of LP-X, an abnormal serum low density lipoprotein, was performed on the sera of 620 patients with jaundice in the U.S. and in England. The results of serial assays over 5-8 days after patient admission to hospital or after onset of jaundice, if this occurred in hospital, correlated best with the type and management of jaundice. In some cases of early cholestatic disease of extrahepatic origin LP-X was absent, but after the observation period, it was found that only 1 of 81 patients with obstruction of the extrahepatic bile duct system remained negative. Of the remainder, 74 had or developed levels of LP-X exceeding 300 mg/100 ml. In addition, 43 of 49 subjects followed serially showed increases in LP-X concentration, with no change in 3 patients. Of 539 subjects with intrahepatic disease, 14 were LP-X positive and 27 of these had initial LP-X levels higher than 300 mg/100 ml. During the follow-up period, 35 of 47 patients with intrahepatic disease showed a reduction of LP-X; of the remaining 12 patients, 4 had mitochondrial antibody-positive primary biliary cirrhosis and 6 had severe cholestasis associated with acute infectious hepatitis and high aspartate transaminase levels. Similar figures for alkaline phosphatase showed less consistent changes during the follow-up period. The trends and absolute levels of LP-X, in addition to the use of similarly followed levels of the routine liver function tests, allowed better differentiation of jaundice requiring surgical correction from that remediable by medical means exclusively than did the use of the routine liver function tests alone. In addition, LP-X is specific for liver dysfunction whereas other routine liver function tests are not.

1772 DIAGNOSTIC USE OF PANCREATIC LIPASE DETERMINATION BY RADIAL ENZYME DIFFUSION, AND DESIGN OF A ROUTINE PANCREATIC PROFILE. (Eng.) Goldberg, J. M. (Stritch Sch. Medicine, Loyola Univ. Chicago, Maywood, IL 60153). *Clin. Chem.* 22(5): 638-642; 1976.

The possibility of using pancreatic lipase determination in the diagnosis of pancreatic disease was tested in 500 hospitalized patients. Radial enzyme diffusion revealed positive results for lipase in 8 patients with elevated serum urea or creatinine, in 7 patients with hyperglycemic fasting sera, in 3 bone fracture patients, and in 14 patients with pancreatitis. Selective screening of possible false positives revealed positive results in all of 30 sera from uremic patients with creatinine levels ranging between 17-140 mg/l, in 4 of 50 sera from hyperglycemic patients, and in 3 of 10 sera from bone fracture patients. In selected high-risk patients, no lipase activity was found in any of 85 patients without proven pancreatic disease or in 17 patients with biliary tree disease, but levels between 56 and 1,120 U/l were found in 22 patients with common duct edema, acute or chronic relapsing pancreatitis, or acute pancreatitis with common duct obstruction. It appears that determination of pancreatic lipase in serum, when used in conjunction with other tests, is useful in the diagnosis of pancreatic disease.

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1837 PATHOPHYSIOLOGY AND DIAGNOSIS OF REFLUX ESOPHAGITIS. (Eng.) Pope, C. E., II (Veterans Admin. Hosp., 4435 Beacon Ave. South, Seattle, WA 98108). *Gastroenterology* 70(3):445-454; 1976.

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1839 TRACHEOMALACIA IN ASSOCIATION WITH CONGENITAL TRACHEOESOPHAGEAL FISTULA. (Eng.) Benjamin, B.; Cohen, D.; Glasson, M. (Royal Alexandra Hosp. Children., Pyrmont Bridge Rd., Camperdown, NSW, Sydney, Australia). *Surgery* 79(5):504-508; 1976.

1840 A MODIFIED METHOD FOR THE REPAIR OF ESOPHAGEAL ATRESIA WITH TRACHEOESOPHAGEAL FISTULA. (Eng.) Lopez-Perez, G. A. (Hosp. Infantil Virgen del Rocio, Seville, Spain). *Surgery* 79(5):499-503; 1976.

See also, 1597, 1605, 1764, 1765, 1775, 1778, 1796, 1797, 2280.

STOMACH

1841 THE MECHANISM OF HYPERGASTRINEMIA IN ACHLORHYDRIA: EFFECT OF FOOD, ACID, AND CALCITONIN ON SERUM GASTRIN CONCENTRATIONS AND COMPONENT PATTERN IN PERNICIOUS ANEMIA, WITH CORRELATION TO ENDOGENOUS SECRETIN CONCENTRATIONS IN PLASMA. (Eng.) Fahrenkrug, J.; Schaffalitzky de Muckadell, O. B.; Hornum, I.; Rehfeld, J. F. (Bispebjerg Hosp., Bispebjerg Bakke 23, DK-2400 Copenhagen NV, Denmark). *Gastroenterology* 71(1):33-37; 1976.

The effect of protein-rich food, i.v. calcitonin injections, and intragastric instillation of hydrochloric acid on serum gastrin concentrations and gastrin component pattern was studied in nine hypergastrinemic patients (pernicious anemia) and nine age- and sex-matched control subjects to determine the mechanism of hypergastrinemia. Plasma secretin concentrations were measured during intragastric acidification with 300 ml of 0.1 M HCl. The intragastric acidification resulted in a rapid fall in serum gastrin concentrations, although not below the upper limit of normal range. The small components, III (gastrin-17-like) and IV (gastrin-13-like), almost disappeared, whereas the concentrations of component I and component II (gastrin-34-like) were less affected. The increase in secretin concentrations after intragastric acidification was smaller in patients with pernicious anemia than in normal subjects, although the difference was not significant. In contrast to the results in normal control subjects, neither food nor calcitonin (0.7 Medical Research Council Units/kg, i.v.) produced significant variations in serum gastrin concentrations and gastrin component pattern of pernicious anemia pa-

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tients. The failure of food to stimulate and of calcitonin to inhibit release of gastrin in the majority of pernicious anemia patients suggests that gastrin secretion in these patients is autonomous. However, considering the recently recognized slow metabolic clearance rate of big gastrins, the effect of intragastric acidification suggests that the mechanism for acid inhibition of the antral gastrin secretion is intact in patients with achlorhydria.

1842 TISSUE PLASMINOGEN ACTIVATOR IN THE PATHOGENESIS OF PROTEIN-LOSING GASTROENTEROPATHY. (Eng.) Kondo, M.; Bamba, T.; Hosokawa, K.; Hosoda, S.; Kawai, K.; Masuda, M. (Kyoto Prefectural Univ. Medicine, Kawaramachi-Hirokoji, Kamikyo-ku, Kyoto 602, Japan). *Gastroenterology* 70(6):1045-1047; 1976.

Changes in tissue fibrinolytic activity were demonstrated in the digestive tract mucosa of patients with protein-losing gastroenteropathy. Two patients, a 25-yr-old man with hypertrophic gastritis and a 40-yr-old man with Menetrier's disease, had hypoproteinemia, and their mucosal fibrinolysis was increased (120 mm^2 and 46 mm^2, resp.) in comparison to that of 30 healthy subjects (range, 10-36 mm^2). Antiplasmin therapy with p.o. trans-4-aminoethyl cyclohexane carboxylic acid (2.25-3 g/day, for 4 months) dramatically increased serum protein and decreased tissue fibrinolytic activity in both patients. Antiplasmin also increased serum protein levels in three other patients, including a woman with Crohn's disease. Antiplasmin therapy produced no response in a man with normal fibrinolytic activity and hypoproteinemia associated with intestinal lymphangiectasia. These observations suggest that activation of the fibrinolytic system in the digestive mucosa may play an important role in the pathogenesis of protein-losing gastroenteropathy.

1843 PRECANCEROUS CHANGES IN THE STOMACH. (Eng.) Kawachi, T.; Kurisu, M.; Numanyu, N. Sasajima, K.; Sano, T.; Sugimura, T. (Natl. Cancer Center Res. Inst., Tsukiji, Chuo-ku, Tokyo, Japan). *Cancer Res.* 36(7):2673-2677; 1976.

A method for visualizing disaccharidases using Tes-Tape was developed to investigate the relation between intestinal metaplasia and gastric carcinoma. This method was applied to over 130 specimens of stomach surgically removed for the treatment of gastric carcinoma. Intestinalization was classified into types I and II intestinal metaplasia. In type I, sucrase, maltase, trehalase, alkaline phosphatase, goblet cells, and Paneth cells were present. In type II, sucrase and maltase were present, but alkaline phosphatase and trehalase were absent. In type II, goblet cells were present but Paneth cells were absent. Some of the villi with goblet cells in the area of intestinalization in the stomach were not stained by sucrase activity, although most of the villi were stained. The presence of a third type of metaplasia was suggested. Purified sucrases obtained from the intestine and one case of type I intestinal metaplasia showed blood group reactivity due to the oligosaccharide side chain. However, purified sucrases obtained from two cases of type II intestinal metaplasia were negative in blood group reactivity. A high content of α-fetoprotein was demonstrated in the areas with intestinal metaplasia surrounding cancer. However, it was not detected or its content was very low in poorly differentiated and in anaplastic cancers. The content of α-fetorptein in intestinal metaplasia surrounding these types of gastric carcinoma was also low. The findings supoort the idea that intestinalization is closely related to the development of stomach cancer.

1844 IMMUNOCHEMICAL STUDY AND CELLULAR LOCALIZATION OF HUMAN PEPSINOGENS DURING ONTOGENESIS AND IN GASTRIC CANCERS. (Eng.) Hirsch-Marie, H.; Loisillier, F.; Touboul, J. P.; Burtin, P. (Faculte de Medecine, Saint-Antoine, Paris, Franc *Lab. Invest.* 34(6):623-632; 1976.

Gastric pepsinogens were studied in gastric mucosa from 22 patients without cancer, in stomach from 48 fetuses (8-38 weeks), and in tissue from 17 patients with gastric carcinoma. In noncancerous adult mucosa, immunoenzymologic methods showed that pepsinogen II (previously called Pg I-II) was found mostly in fundic or mediogastric extracts, whereas Pg IV was predominant in antropyloric extracts. Pg II was localized by immunofluorescence techniques in the chief cells of deep glands found near the muscularis. Pg III was present in the superficial zone of deep glands and Pg IV was found in the surface epithelium and in the superficial glands of the mucosa. In fetal stomach, only Pg IV ("fetal pepsinogen") was identified by standard immunoelectrophoresis. It was localized by immunofluorescence in the superficial epithelium. However, bidimensional immunoelectrophoresis and immunofluorescence did reveal low levels of Pg II and Pg III by the eighth or ninth week of ontogenesis. Pg II and Pg III were localized in the rudimentary glands near the superficial epithelium. Important differences were noted when gastric carcinomas were compared with normal mucosa. Pg II or Pg III were often absent in the tumor extracts, but Pg IV was regularly and, at times, exclusively identified regardless of the location of the tumor. Pg IV was often the only pepsinogen that was characterized in dedifferentiate cancerous cells by immunofluorescence; this was also true of the calciform cells of some metaplastic gastric mucosa. Pg III was observed rarely, and Pg II never, in cancerous cells. The biochemical modifications of the cancerous tissue closely resemble those of fetal tissue.

1845 GASTRIC ULCERS IN THE FUNDIC GLAND AREA. (Eng.) Tatsuta, M.; Okuda, S. (Center for Adult Diseases, Osaka, Japan). *Gastroenterology* 71(1):16-18; 1976.

The endoscopic Congo red test was performed on 216 patients with gastric ulcers (232 lesions) to examine the relation between gastric ulcers and acid-secreting areas. Eighteen of the ulcers examined (7.8%) were surrounded by an acid-secreting area (fundic gland area). Histological examination of specimens obtained by gastrectomy also showed that five of the lesions examined (4.5%) were located in the fundic gland area. Ulcers in the fundic gland area were found most frequently in the angulus and lower gastric body, adjacent to the acid-secreting boundary. These ulcers were associated with little or no fundal gastritis, whereas ulcers in the pyloric gland area were usually associated with moderate or severe fundal gastritis. Unlike ulcers of similar depth in the pyloric gland area, ulcers surrounded by normal fundic mucosa healed rapidly and completely. No recurrence of these ulcers was seen in a 1-yr endoscopic follow-up period. This study demonstrates that peptic ulcers can be found in the fundic mucosa in contrast to previous findings that the fundic mucosa is resistant to HCl and that peptic ulcers never develop in this region. Two hypotheses concerning the etiology of this type of ulcer are discussed: (a) severe superficial changes at the onset of ulceration disturbed the acid-secreting function of the fundic mucosa adjacent to the acid-secreting boundary; and (b) the normal fundic mucosa may undergo ulceration due to disturbance of blood vessels in the gastric mucosa.

1846 EFFECT OF HISTAMINE H_2-RECEPTOR BLOCKADE ON GASTRIC EMPTYING AND SERUM GASTRIN IN MAN.

(Eng.) Forrest, J. A. H.; Heading, R. C.; Park, J.; Carter, D. C.; Lennon, J.; Lidgard, G.; Shearman, D. J. C. (Royal Infirmary, Edinburgh, Scotland). *Scott. Med. J.* 21(1):23-27; 1976.

The effect of p.o. administered metiamide on the rate of gastric emptying was assessed in 24 uncomplicated duodenal ulcer patients given a standard meal containing indium 113m DTPA chelate; the effect of metiamide on the serum gastrin response to a protein meal was also studied in 7 healthy men. Metiamide (four 100-mg tablets) produced a significant slowing of gastric emptying when compared with control studies performed on the same patients following p.o. administration of a placebo. Paired experiments demonstrated that a significantly greater elevation of serum gastrin occurred after metiamide than after placebo in the seven volunteers. The delay in gastric emptying produced by metiamide may be mediated by an elevation of the serum gastrin concentration. In patients with peptic ulcer disease, this could lead to a rebound in gastric acid secretion and recurrence of peptic ulceration when the drug is stopped.

1847 TREATMENT OF STRESS-INDUCED UPPER GASTROINTESTINAL/HAEMORRHAGE WITH METIAMIDE.

(Eng.) MacDonald, A. S.; Steele, B. J.; Bottomley, M. G. (Dalhousie Clinical Res. Center, 5849 University Ave., Halifax, Nova Scotia, B3H 4H7, Canada). *Lancet* 1(7950):68-70; 1976.

The H2-blocking antihistamine metiamide was used to treat 14 episodes of bleeding from the stomach or duodenum in 11 patients. In 11 instances, bleeding was due to erosive gastritis or duodenitis. It promptly ceased after administration by gastric tube of one or two doses of 300 mg metiamide at 6-hr intervals and it did not recur as long as the drug was continued. In the two instances in which the bleeding continued, chronic ulcers eroded into major blood vessels. There were no complications from the drug even in five patients with severe bone marrow suppression after renal transplantation. Metiamide seems to be a safe and highly effective agent in the control of bleeding due to erosive gastritis.

1848 HEALING OF GASTRIC ULCER DURING TREATMENT WITH CIMETIDINE.

(Eng.) Pounder, R. E.; Stekelman, M.; Hunt, R. H.; Milton-Thompson, G. J.; Misiewicz, J. J. (Central Middlesex Hosp., London, NW10 7NS, England). *Lancet* 1(7955):337-339; 1976.

Ten patients with benign gastric ulcer were treated with cimetidine (0.8 or 1.6 g/day) for 6 weeks to determine its effect on healing. Weekly examinations revealed rapid relief of symptoms. At the end of treatment, endoscopy showed that all the ulcers had healed. Healing was not associated with an improvement of acute atrophic gastritis or with any change of gastric mucosal potential difference. No untoward clinical or laboratory effects were observed. The results suggest that cimetidine be used in controlled trials in patients with gastric ulcer.

1849 EFFECT OF METOCLOPRAMIDE IN CHRONIC GASTRIC RETENTION AFTER GASTRIC SURGERY.

(Eng.) Metzger, W. H.; Cano, R.; Sturdevant, R. A. L. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 71(1):30-32; 1976.

The effect of metoclopramide on gastric emptying was tested in six patients with chronic gastric retention after vagotomy and gastric resection. Gastric emptying was measured using a gamma camera technique and a solid meal labeled with ^{99m}technetium-labeled diethylenetriaminepentaacetic acid. Metoclopramide (10 mg, i.m.) produced a 2.6-fold increase in gastric emptying in the first 90 min after eating the meal, compared to placebo ($p<0.01$). Metoclopramide did not alter gastric emptying in eight normal volunteers. These data indicate that metoclopramide may be useful in treatment of patients with chronically impaired gastric emptying after gastric surgery.

1850 BILE-INDUCED ACUTE EROSIVE GASTRITIS: ITS PREVENTION BY ANTACID, CHOLESTYRAMINE, AND PROSTAGLANDIN E_2.

(Eng.) Mann, N. S. (Veterans Admin. Hosp., 800 Zorn Ave., Louisville, KY 40202). *Am. J. Dig. Dis.* 21(2):89-92; 1976.

Experiments were conducted to determine whether the intragastric administration of whole bile (2.0 ml/

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hr, 4 times) produced acute erosive gastritis in rats, and if this could be prevented by concomitant intragastric administration of an antacid (Maalox, 1 ml/hr, 4 times), cholestyramine (0.5 g in 2.0 ml saline/hr, 4 times), or prostaglandin E_2 (1 mg in 1.0 ml saline/hr, 4 times). Microscopic examination confirmed the presence of superficial mucosal ulceration and submucosal congestion and hemorrhage in the animals treated with bile only. The number of acute erosions was significantly reduced in the animals treated with one of the three test substances ($p<0.001$), and prostaglandin E_2 seemed more effective than Maalox or cholestyramine. The results demonstrate that the administration of whole bile produces erosive gastritis in rats and that the concomitant intragastric administration of an antacid, a bile salt binding resin, and a prostaglandin is effective in preventing this type of experimental acute erosive gastritis.

1851 GASTRIC INFARCTION AFTER THERAPEUTIC EMBOLIZATION. (Eng.) Bradley, E. L., III; Goldman, M. L. (Emory Univ. Sch. Medicine, 69 Butler St., S.E., Atlanta, GA 30303). *Surgery* 79(4):421-424; 1976.

The limitations of therapeutic transcatheter embolization of the gastric artery are illustrated in the case of a 62-yr-old woman who was treated for recurrent massive upper gastrointestinal hemorrhage. Angiography revealed a point source in the distribution of the left gastric artery. Bleeding continued despite pitressin infusion, and a specific bleeding point could not be found. Vagectomy, pyloroplasty, and gastrostomy were performed; splenectomy was also necessary, as the splenic capsule was torn during surgery. Embolization of the left gastric artery was performed, using fragments of absorbable gelatin sponge, together with pitressin infusion (0.2 U/min, 10 hr). Twelve days later, a dehiscence of the superior aspect of the wound revealed extensive gastric necrosis; postmortem examination revealed that the entire cardia and fundus were absent. The ischemic gastric necrosis in this patient was thought to be secondary to failure of collateral circulation after embolic occlusion of the left gastric artery and pitressin infusion. Exploration of the posterior aspect of the stomach through the gastrocolic omentum and the incidental splenectomy resulted in the loss of the majority of gastroepiploic arterial supply. It is suggested that selective embolization be reserved for patients who cannot be controlled on pitressin infusion and who represent prohibitive surgical risks.

1852 ANTACIDS FOR OBSTETRIC PATIENTS. (Eng.) Burgess, G. E., III (Beth Israel Hosp., 330 Brookline Ave., Boston, MA 02215). *Am. J. Obstet. Gynecol.* 123(6):577-579; 1975.

1853 ENTERIC-COATED ASPIRIN OVERDOSE AND GASTRIC PERFORATION. (Eng.) Farrand, R. J.; Green, J. H.; Haworth, C. (Hope Hosp., Salford, Manchester M6 8HD, England). *Br. Med. J.* 4(5988):85-86; 1975.

1854 GASTRONE, AN ANTRAL INHIBITOR OF GASTRIC SECRETION. (Eng.) Monetti, G. (via Bisceglie, 21, Trani, Italy). *Chir. Gastroenterol.* 9(1):129-138; 1975.

1855 EFFECT OF PHENFORMIN ON THE RESPONSE OF PLASMA INTESTINAL GLUCAGON-LIKE IMMUNOREACTIVITY (GLI) TO ORAL GLUCOSE IN GASTRECTOMIZED SUBJECTS. (Eng.) Shima, K.; Sawazaki, N.; Morishita, S.; Tarui, S.; Nishikawa, M. (Osaka Univ. Medical Sch., Osaka, Japan). *Proc. Soc. Exp. Biol. Med.* 150(1):232-236; 1975.

1856 INFLUENCE OF THE LENGTH OF HEINEKE-MIKULICZ PYLOROPLASTY ON THE AREA OF GASTRIC OUTLET. (Eng.) Davies, M.; Taylor, T. V. (Royal Infirmary, Manchester M13 9WL, England). *Digestion* 12(3):152-156; 1975.

1857 THE IMPORTANCE OF AN INNERVATED AND INTACT ANTRUM AND PYLORUS IN PREVENTING POSTOPERATIVE DUODENOGASTRIC REFLUX AND GASTRITI (Eng.) Keighley, M. R. B.; Asquith, P.; Edwards, J. A. C.; Alexander-Williams, J. (General Hosp., Birmingham, England). *Br. J. Surg.* 62(10):845-849; 1975.

1858 PRIMARY AMYLOIDOSIS OF THE STOMACH. (Rus.) Mordvinkina, T. N. (Leningrad Inst. Medicine and Hygiene, Leningrad, USSR). *Klin. Khir.* (9):70-71; 1975.

1859 GASTRIC BULLAE: AN EARLY ROENTGEN FINDING IN CORROSIVE GASTRITIS FOLLOWING ALKALI INGESTION. (Eng.) Levitt, R.; Stanley, R. J.; Wise, L. (Washington Univ. Sch. Medicine 510 S. Kingshighway, St. Louis, MO 63110). *Radiolog* 115(2):597-598; 1975.

1860 GASTRIC STUMP CANCER. (Rus.) Druianov, B. M.; Gracheva, N. I. (Moscow Medical Inst. Stomatology, Moscow, USSR). *Khirurgii (Mosk.)* (9):10-13; 1975.

1861 PRIMARY CARCINOMA OF THE GASTRIC STUMP. (Spa.) Ramirez Armengol, J. A. (Hospital Clinico de San Carlos, Universidad Complutense, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(5):535-540; 1975.

1862 COMPLICATIONS AND EARLY SECONDARY INTERVENTIONS AFTER GASTRIC SURGERY FOR CANCER. (Rus.) Borozdina, R. B.; Ponomarev, A. A. (I. P. Pavlov Riazan Medical Inst., Riazan, USSR). *Klin. Khir.* (10):70-71; 1975.

1863 THERAPEUTIC VALUE OF THE ALCOHOL-NOVOCAIN BLOCKADE OF THE SOLAR GANGLION IN ADVANCED GASTRIC CANCER. (Rus.) Shvetsov, S. K. (Ivanovo Medical Inst., Ivanovo, USSR). *Klin. Khir.* (10):30-33; 1975.

1864 STRANGULATED EOSINOPHILIC GRANULOMA OF THE STOMACH. (Rus.) Pivinskii, N. P.; Prokhur, V. Z. (Poltava, USSR). *Khirurgiia (Mosk.)* (9):123; 1975.

1865 POSSIBILITIES OF SELECTIVE ANGIOGRAPHY WITH HISTAMINE FOR THE DETERMINATION OF OPERABILITY IN STOMACH CANCER. (Rus.) Antonovich, V. B.; Rozanov, I. B.; Privezentseva, T. V.; Leonova, M. T. (Central Inst. Postgraduate Training Physicians, USSR Ministry Health, Moscow, USSR). *Med. Radiol. (Mosk.)* 20(8):21-23; 1975.

1866 RARE CASE OF MULTICENTRIC CANCER OF THE STOMACH. (Rus.) Dovlatian, A. A. (Inst. Experimental and Clinical Oncology, Moscow, USSR). *Khirurgiia (Mosk.)* (9):124-125; 1975.

1867 LEIOMYOBLASTOMA OF THE STOMACH: REPORT OF 9 CASES. (Eng.) Faegenburg, D.; Farman, J.; Dallemand, S.; Schechter, L. S.; Rosen, Y.; Chiat, H. (Nassau Hosp., Mineola, NY 11501). *Radiology* 117(2):297-300; 1975.

1868 METHOD FOR SURGICAL MANAGEMENT OF DUMPING SYNDROME. (Rus.) Chuikov, A. I. (Nikolaev Municipal Hosp. No. 4, Nikolaev, USSR). *Klin. Khir.* (9):57-59; 1975.

1869 STUDIES ON THE RELATIONSHIP BETWEEN THE QUALITIES OF SUBSTITUTE STOMACHS AND THE OCCURRENCE OF THE DUMPING SYNDROME AFTER TOTAL GASTRECTOMY. (Eng.) Toshimitsu, M. (Yamaguchi Univ. Sch. Medicine, Japan). *Arch. Jpn. Chir.* 44(4):281-312; 1975.

1870 MORPHOLOGICAL CHARACTERISTICS OF CHRONIC GASTRITIS WITH NORMAL AND INCREASED GASTRIC SECRETORY FUNCTION IN CHILDREN. (Ukr.) Ostropolets', S. S.; Kimbarovs'ka, O. M.; Mel'nik, A. I.; Buz'ko, E. F.; Parivona, E. I. (Donetsk Medical Inst., Donetsk, USSR). *Pediatr. Akush. Ginekol.* 37(4):3-6; 1975.

1871 POSTOPERATIVE GASTRITIS. (Rus.) Galimova, L. I.; Alekseenko, V. E. (Kharkov Medical Inst., Kharkov, USSR). *Klin. Khir.* (9):37-41; 1975.

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1877 GASTRIC PHYCOMYCOSIS: EARLY PATHO-ANATOMICAL AND MYCOLOGICAL DIAGNOSIS. FAVORABLE COURSE UNDER DRUG AND SUBSEQUENT SURGICAL THERAPY. (Fre.) Douvin, D.; Lefichoux, Y.; Huguet, C. (Faculte de Medecine St-Antoine, 184, rue du Faubourg-Saint-Antoine, 75571 Paris Cedex 12, France). *Arch. Anat. Pathol. (Paris)* 23(2):133-138; 1975.

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1879 GASTRIC CYSTIC POLYPOSIS. (Eng.) Chakravorty, R. C.; Schatzki, P. F. (Veterans Admin. Hosp., Salem, VA 24153). *Am. J. Dig. Dis.* 20(10):981-989; 1975.

1880 "BURNED-OUT" PYLORIC STENOSIS: AN ELUSIVE GASTRIC OUTLET OBSTRUCTION. (Eng.) Swischuk, L. E.; Tyson, K. R. (Univ. Texas Medical Branch, Galveston, TX 77550). *Radiology* 117(2):373-379; 1975.

1881 PRIMARY HYPERTROPHIC PYLORIC STENOSIS IN ADULT. (Eng.) Mosavy, S. H.:

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Hagighi, J. (Isfahan, Iran). *Abdom. Surg.* 17(10): 237-238; 1975.

1882 STRESS ULCERATION IN THE ACUTELY ILL. (Eng.) Skillman, J. J.; Silen, W. (Harvard Medical Sch., Boston, MA 02215). *Annu. Rev. Med.* 27:9-22; 1976.

1883 EFFECT OF SINGLE AND REPEATED ADMINISTRATION OF SULPIRIDE ON THE RESTRAINT ULCER IN THE RAT. (Eng.) Strocchi, P.; Gandolfi, O.; Montanaro, N. (Inst. Pharmacology, Univ. Bologna Via Irnerio 48, I-40126 Bologna, Italy). *Arzneim. Forsch.* 26(3):419-421; 1976.

See also, 1622, 1630, 1633, 1644, 1763, 1764, 1778, 1787, 1788, 1790, 1796, 1797, 1798, 1802, 1814, 1815, 1819, 1826, 1831, 1835, 1885, 1888, 1889, 1894, 1896, 1898, 1902, 1903, 1905, 1921, 1926, 1929, 2934, 1950, 1983, 2021, 2198, 2243, 2257, 2280.

Stomach

Peptic Ulcers

1884 GASTRIC AND DUODENAL ULCER AND THEIR ASSOCIATED DISEASES. (Eng.) Langman, M. J. S.; Cooke, A. R. (City Hosp., Nottingham NG5 1PB, U.K.). *Lancet* 1(7961):680-683; 1976.

The relation between gastric and duodenal ulcer and their associated diseases is discussed. Assessments of likely associations are hindered by the frequent lack of controls, by controls that are inadequate, by inadequate descriptions of techniques, and by inherent biases in some of the techniques. Ulcer is unusually frequent in patients undergoing treatment for chronic renal failure. It is possibly more frequent in association with hyperparathyroidism and in cirrhosis, in cardiovascular disease (except hypertension), and in chronic respiratory disease. The authors conclude that there is insufficient evidence for other associations.

1885 PYLORIC-SPHINCTER STUDIES IN PEPTIC-ULCER PATIENTS. PYLORUS IN PEPTIC ULCER. (Eng.) Valenzuela, J. E.; Defilippi, C. (Veterans Admin. Wadsworth Hosp. Center, Building 115, Room 115, Los Angeles, CA 90073). *Am. J. Dig. Dis.* 21(3):229-232; 1976.

Pyloric pressure was assayed by a manometric procedure in the basal state and 10 min after intraduodenal infusion of 0.1 N HCL in 13 control subjects, 11 patients with benign gastric ulcer, 8 patients with duodenal ulcer, and 2 patients with coexistent gastric and duodenal ulcers. Mean resting pyloric pressure in gastric ulcer patients (5.17 mm Hg) was significantly lower than in controls (9.40 mm Hg) and it did not increase after HCl perfusion into the duodenum. Mean basal pyloric pressure in duodenal ulcer patients (11.30 mm Hg) did not differ significantly from controls and it increased after intraduodenal perfusion of HCl to 15.72 mm Hg. The two patients with coexistent ulcers had manometric patterns similar to those of gastric ulcer patients. Decreased pyloric sphincter pressure in gastric ulcer patients may be the mechanism responsible for the increased duodeno-gastric reflux observed in these patients.

1886 PERFORATED PEPTIC ULCER LONG-TERM FOLLOW-UP. (Eng.) Hennessy, E. J.; Chapman, B. L.; Duggan, J. M. (Royal Newcastle Hosp., Newcastle, New South Wales 2300). *Med. J. Aust.* 1:50-53; 1976.

A series of 349 survivors of perforated peptic ulcer was followed for periods of up to 23 yr. Almost 9 out of every 10 patients suffered from dyspepsia during follow-up. Subsequent elective gastroduodenal surgery was required in more than 25% of the cases. The surgery rate for gastric ulcer was more than 1.5 times that for pyloroduodenal ulcer, and for females it was almost double that for males. The highest rate of all was for females with gastric ulcer, almost 50% of them underwent surgery. One in 5 patients bled during follow-up; 1 in 8 developed stenosis of the stomach or duodenum; and 1 in 11 perforated again. There was a significantly increased incidence of subsequent perforation and stenosis in those patients with an initial perforation of 5 mm or more in diameter. Gastric carcinoma occurred in less than 2% of the cases and was restricted to cases of pyloroduodenal perforation. When complications occurred, the majority did so within 5 yr. Of the 262 patients about whom complete information was available, only 15% had no complications on follow-up. The indications for definitive surgery at perforation should be extended to include perforated gastric ulcer in the female, particularly if the ulcer is large.

1887 GASTRIC PROSTAGLANDIN E OUTPUT DURING BASAL AND STIMULATED ACID SECRETION IN

NORMAL SUBJECTS AND PATIENTS WITH DUODENAL ULCER. (Eng.) Cheung, L. Y.; Jubiz, W.; Moore, J. G. (Univ. Utah Medical Center, 50 North Medical Drive, Salt Lake City, UT 84132). *J. Surg. Res.* 20(4):369-372; 1976.

Prostaglandin E (PGE) output into the gastric lumen under basal conditions and after insulin hypoglycemia was studied in four normal subjects and in eight patients with uncomplicated duodenal ulcers. In both groups, increased acid secretion following vagal stimulation was accompanied by a rise in PGE output, as determined by radioimmunoassay. This observation, together with the known inhibitory effect on acid secretion, supports the concept that synthesis and local release of PGE may play a regulatory role. The fact that patients with ulcer disease have a slightly higher PGE output in gastric juice during basal and stimulated acid secretion does not support the hypothesis that PGE deficiency is an underlying mechanism in the pathogenesis of acid peptic disease.

1888 THE EFFECT OF BETAZOLE ON SERUM GROUP I PEPSINOGEN LEVELS: STUDIES IN SYMPTOMATIC PATIENTS WITH AND WITHOUT RECURRENT ULCER AFTER VAGOTOMY AND GASTRIC RESECTION OR DRAINAGE.

(Eng.) Samloff, I. M.; Secrist, D. M.; Passaro, E., Jr. (Harbor General Hosp., 1000 W. Carson St., Torrance, CA 90509). *Gastroenterology* 70(6):1007-1013; 1976.

The effect of betazole (1.5 mg/kg body weight) on serum group I pepsinogen (PG) levels was investigated in 50 symptomatic postoperative patients (20 with and 30 without recurrent ulcer), after either a vagotomy and gastric resection or a drainage procedure. In patients with recurrent ulcer, mean serum PG I levels increased after betazole and reached a maximum of 116.5 ± 2.2% (SE) of basal at 2 hr. Mean levels were significantly greater than basal at 1 hr ($p<0.01$) and at 90 and 120 min ($p<0.001$). In contrast, the basal level was significantly less ($p<0.001$) in patients with no recurrent ulcer than in patients with recurrent ulcer. Mean serum PG I levels decreased in patients without recurrent ulcer and reached a nadir of 75.0 ± 4.3% of basal at 2 hr. All 20 patients with recurrent ulcer and 5 patients without recurrence had a 2-hr serum PG I level of more than 98% of basal. A 2-hr serum PG I level of more than 98% of basal was also correlated with a vagotomy and drainage; a peak acid output of more than 11 mEq/hr ($p<0.001$), and a positive insulin test, with a level of less than 92% of basal, was correlated with a vagotomy and gastric resection, a peak acid output of less than 11 mEq/hr, and a negative insulin test. Basal serum PG I and serum gastrin levels were significantly higher ($p<0.001$) in patients with the former type of PG I response. The results indicate that betazole has a differential effect on serum PG I levels in symptomatic postoperative patients with and without recurrent ulcer.

1889 THE EFFECT OF CIMETIDINE, A NEW HISTAMINE H_2-RECEPTOR ANTAGONIST, ON MEAL-STIMULATED ACID SECRETION, SERUM GASTRIN, AND GASTRIC EMPTYING IN PATIENTS WITH DUODENAL ULCER.

(Eng.) Richardson, C. T.; Walsh, J. H.; Hicks, M. I. (Univ. Texas Health Science Center Dallas, Dallas, TX). *Gastroenterology* 71(1):19-23; 1976.

The effect of cimetidine on meal-stimulated acid secretion, measured by *in vivo* intragastric titration, was studied in nine patients with duodenal ulcer. Meal-stimulated acid secretion was progessively inhibited by increasing p.o. doses of cimetidine (25-400 mg). Four hundred mg suppressed acid secretion by 73% for the first 3 hr after the meal, whereas it inhibited acid secretion by 94% during the 30-min period of maximal inhibition. The dose of cimetidine required to suppress acid secretion by 50% during the 30-min period of maximal inhibition was 25 mg. The duration of action of a 300-mg dose was at least 7 hr. Cimetidine was equally effective in inhibiting meal-stimulated acid secretion at two physiological intragastric pH levels (5.0 and 2.5). It had no effect on serum gastrin concentration when intragastric pH was maintained at 5.0, but when pH was allowed to seek its own level, serum gastrin concentration was higher after cimetidine than after placebo. This probably occurred because of decreased acid secretion, and therefore decreased total acid, after cimetidine. Cimetidine had no effect on gastric emptying, and no side effects were noted in any patients. These experiments demonstrate that cimetidine is as effective an acid inhibitor as metiamide.

1890 CIMETIDINE SUPPRESSION OF NOCTURNAL GASTRIC SECRETION IN ACTIVE DUODENAL ULCER.

(Eng.) Longstreth, G. F.; Go, V. L. W.; Malagelada, J. R. (Gastroenterology Unit, Mayo Clinic, Rochester, MN 55901). *N. Engl. J. Med.* 294(15):801-804; 1976.

The antisecretory effects of cimetidine, an H2-receptor antagonist, were investigated in eight men with active duodenal ulcers. Doses of 200, 300, or 400 mg were taken p.o. at bedtime. In all cases, cimetidine depressed acid output and profoundly increased intragastric pH within 1 hr of digestion. Anacidity ($pH \geq 7.0$) was obtained in five of the six patients who received 400 mg and in five of the six patients who were given 300 mg, but in none of the four patients who were given 200 mg. The 400 and 300 mg doses caused a significant overall (12 midnight to 7 a.m.) decrease in acid output ($p<0.001$) and an increase in intragastric pH ($p<0.01$). The 200 mg dose caused no significant changes in acid output and had only a borderline effect on pH. The relation of dose to effect differed significantly among patients ($p<0.001$). Cimetidine caused a substantial decrease in secretory volume output. Doses of 400, 300, and 200 mg produced significant effects on overall secreted volume ($p<0.01$, $p<0.01$, and $p<0.02$, resp.), but no significant difference was found among doses. Dose related increases of drug blood levels were observed and correlated with the degree and duration of acid output inhibition.

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Serum gastrin levels were unaffected, and no significant correlation was found between total bile acid refluxed and total acid output. Cimetidine had no effect on serum gastrin values. It is concluded that cimetidine appears to be a potent inhibitor of nocturnal gastric secretion.

1891 INHIBITION OF NOCTURNAL ACID SECRETION IN DUODENAL ULCER PATIENTS BY AN H-2 HISTAMINE ANTAGONIST--CIMETIDINE: A CONTROLLED DOUBLE-BLIND INVESTIGATION. (Eng.) Hollander, D.; Hossain, Z.; Sufi, A. M. (Scott Hall of Basic Medical Services, Wayne State Univ., Detroit, MI 48201). *Am. J. Dig. Dis.* 21(5):361-365; 1976.

The ability of cimetidine to suppress overnight gastric acid secretion was tested in eight male duodenal ulcer patients. In a double-blind controlled investigation, each volunteer was studied during four consecutive nights. In randomized order they received either 100-, 200-, or 300-mg cimetidine tablets or a placebo. No clinical or laboratory side effects of the drug were found. Single-dose p.o. administration of 300 mg cimetidine caused a significant ($p<0.05$) inhibition of overnight gastric acid secretion for an 8-hr period, with the intragastric pH remaining between 3.5-6.0. Because of its potent gastric acid inhibitory effect, cimetidine may become an important therapeutic agent in the management of peptic ulcer disease.

1892 EFFECT OF SYNTHETIC 15-METHYL ANALOG OF PGE_2 ON GASTRIC ACID AND SERUM GASTRIN RESPONSE TO PEPTONE MEAL, PENTAGASTRIN, AND HISTAMINE IN DUODENAL ULCER PATIENTS. (Eng.) Konturek, S. J.; Oleksy, J.; Biernat, J.; Sito, E.; Kwiecien, N. (Inst. Physiology, 31-531 Krakow, Grzegorzecka 16, Poland). *Am. J. Dig. Dis.* 21(4):291-295; 1976.

The effect of 15(S) 15-methyl prostaglandin E_2, methyl ester (15-ME-PGE_2, 0.5 μg/kg/hr, i.v.) on gastric secretion and serum gastrin level was studied in six duodenal ulcer patients. 15-Me-PGE_2 caused an immediate and almost complete inhibition of basal gastric acid and pepsin secretion. Acid secretion, induced by a peptone meal and determined by an intragastric titration technique, was almost as high as the maximal response to histamine and it was accompanied by a significant rise in serum concentration of immunoassayable gastrin. 15-Me-PGE_2 caused a sudden and complete inhibition of gastric acid response to a peptone meal. 15-Me-PGE_2 did not significantly affect serum gastrin levels under basal conditions and in response to a peptone meal. Gastric acid and pepsin outputs induced by maximal stimulation with pentagastrin (4 μg/kg-hr) were inhibited by 15-Me-PGE_2 by about 70% and those induced by histamine were inhibited by about 45%. After the withdrawal of 15-Me-PGE_2 infusion, gastric secretion remained reduced for the duration of the test. It is concluded that 15-Me-PGE_2 is a very strong inhibitor of gastric acid and pepsin secretion induced by various secretory stimuli, particularly under basal conditions and in response to a meal. In view of its prolonged inhibitory activity, 15-Me-PGE_2 may have clinical potential in the treatment of peptic ulcer disease.

1893 INHIBITION OF GASTRIC SECRETION BY EXOGENOUS SECRETIN AND CHOLECYSTOKININ IN NORMALS AND DUODENAL ULCER PATIENTS. (Eng.) Jorgensen S. P.; Henriksen, F. W. (Rigshospitalet, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(Suppl. 37):39-42; 1976.

The inhibitory effect of combined secretin (0.5 and 1.0 clinical U/kg/hr) and cholecystokinin (0.5 and 1.0 Ivy dog U/kg/hr) on the pentagastrin-stimulated (0.15-1.0 and 6.0 μg/kg/hr) gastric secretion in 12 normal volunteers was compared with that in 12 duodenal ulcer patients. Regardless of the dose level, the gastric secretion of fluid and acid was inhibite to the same extent in the normal subjects as in the duodenal ulcer patients, indicating that a decreased sensitivity to secretin and cholecystokinin is not a pathogenetic factor for the development of duodenal ulcer.

1894 EFFECT OF SECRETIN ON GASTRIC FUNCTION IN NORMAL SUBJECTS AND IN PATIENTS WITH DUODENAL ULCER. (Eng.) Dalton, M. D., Eisenstein, A. M.; Walsh, J. H.; Fordtran, J. S. (Univ. Texas Southwestern Medical Sch., 5323 Harry Hines Blvd., Dallas, TX 75235). *Gastroenterology* 71(1): 24-29; 1976.

The effect of constant i.v. infusion of secretin (0.25, 0.50, 1.50, and 3.0 μg/kg/hr) on meal-stimula ed acid secretion was measured by *in vivo* titration to pH 5.0 in seven normal subjects and in two men with exocrine pancreatic insufficiency due to chroni alcoholism. The pattern and degree of secretin inhibition of food-stimulated acid secretion depended upon when the secretin infusion was begun; the effect was more pronounced when the secretin was begun 1 hr before the test meal than when the meal and secretin infusions were begun simultaneously. I hibition of acid secretion in the normal subjects was approximately the same as in the patients with pancreatic exocrine insufficiency who could secrete only small amounts of pancreatic bicarbonate in response to secretin. Secretin at 0.25 and 0.5 μg/kg/hr inhibited acid secretion only slightly, whereas 3.0 μg/kg/hr completely stopped acid secretion. Inhibition of acid secretion by secretin was similar in controls and in patients with duodenal ulcer. Secretin also reduced the rise in serum gastrin concentration after the meal and delayed gastric emptying; both responses were approximately the same in normals and in duodenal ulcer patients. Secretin inhibited basal gastric acid secretion but had no consistent effect on basal serum gastrin concentration.

1895 GENETICS OF DUODENAL ULCER. (Eng.) Anonymous. (No affiliation given). *Br. Med. J.* 3(5983):557-558; 1975.

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1901 A NEW FACTOR IN THE BLOOD OF PATIENTS WITH PEPTIC ULCER: DISTRIBUTION IN BLOOD FRACTIONS. (Eng.) Necheles, H.; Geisel, A.; Berg, M.; Jefferson, N. C. (Michael Reese Medical Center, 1303 Golden Rain Rd., #2 Walnut Creek, CA 94595). *Am. J. Gastroenterol.* 64(2):99-103; 1975.

1902 PLASMA FIBRINOLYTIC SYSTEM OF PERIPHERAL AND GASTRIC VENOUS BLOOD IN CHRONIC PEPTIC ULCER AND GASTRIC CARCINOMA. (Pol.) Puchalski, Z.; Propkopwicz, J.; Gabryelewicz, A. (15-276 Bialystok, ul. M. C. Skolodowskiej 24a, Poland). *Pol. Przegl. Chir.* 48(3):369-373; 1976.

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1931 HOIGNE REACTION IN PATIENTS WITH CHRONIC GASTRITIS AND ULCER DISEASE. (Rus.) Vainshtein, S. G.; Chumakova, A. V. (V. I. Lenin Kazan Inst. Postgraduate Training Physicians, Kazan, USSR). *Vrach. Delo* (4):39-41; 1975.

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See also, 1634, 1763, 1797, 1798, 1846, 1857, 2253, 2255.

SMALL INTESTINE

1933 ON DIPEPTIDASE ACTIVITY IN SMALL INTESTINAL MUCOSA IN PATIENTS WITH CHRONIC NONSPECIFIC ENTERITIS. (Bul.) Nikolov, N.; Nedkova-Bratanova, N.; Ivanov, E.; Krusteva, A.; Lozanova, L.; Bozijanov, V.; Milev, N. (Inst. Gastroenterology, Bulgaria). *Vutr. Bol.* 14(1):11-16; 1975.

Dipeptidase activity in homogenate form from small intestinal mucosa was determined in 45 patients (25 women, 19 men) with chronic nonspecific enteritis. Control patients had peptic ulcer and chronic alcoholism without intestinal disease and normal small intestinal mucosa. Most enzymes belonged to the endopeptidase group, splitting the dipeptides into the neutral amino acids: glycyl-l-alanine, alanyl-l-valine, alanyl-l-isoleucine, alanyl-glycine, leucyl-l-leucine, alanyl-l-leucine, alanyl-l-proline, glycyl-l-glutamic acid; only one enzyme, glycyl-l-leucine, belonged to enzymes of the brush border enterocytic zone. The mean values of dipeptidase activity in chronic nonspecific enteritis were decreased significantly in comparison with the mean values obtained from control patients. Glycyl-l-alanine activity was decreased by 49.2%, glycyl-l-leucine by 33.2%, glycyl-l-valine by 19.6%, glycyl-l-isoleucine by 61%. In most cases, decreased enzyme activity was proportional to the severity of the disease and to the degree of histologic changes. However, it was not decreased to the level found in patients with celiac sprue. In some cases, enzyme activity did not correspond to morphological changes: normal mucosa and decreased peptidase activity coexisted in six patients, and normal or elevated peptidase activity was found together with partial mucosal atrophy in two cases. The findings suggest that these enzymes are significant for pathogenetic digestive and resorptive disturbances, especially for protein disturbances in chronic nonspecific enteritis.

1934 ARTERIOVENOUS MALFORMATIONS OF THE GASTROINTESTINAL TRACT. (Eng.) Moore, J. D.; Thompson, N. W.; Appelman, H. D.; Foley, D. (Dept. Surgery, Univ. Michigan, Ann Arbor, MI 48104). *Arch. Surg.* 111(4):381-388; 1976.

Seventeen patients (7 months-81 yr) who were diagnosed over an 8-yr period as having arteriovenous malformations (AVM's) of the gastrointestinal tract complicated by major hemorrhage are reviewed; seven case reports are presented. A clinical classification of AVM's was developed, based on angiographic characteristics, localization, age of the patient, and family history. Type 1 AVM's were solitary, localized lesions within the right side of the colon. They occurred in seven patients, 55 yr of age or older. None were palpable or visible at operation. Type 2 AVM's occurred in seven patients. They were larger and were occasionally visible in the small intestine; they were probably of congenital origin. All symptoms began before the patients were 50 yr of age. Type 3 AVM's were punctate angiomas causing gastrointestinal hemorrhage. They occurred in three patients with the classical findings of hereditary hemorrhagic telangiectasia. Most AVM's can be diagnosed preoperatively only by selective angiographic studies.

1935 THE MICROBIAL ECOLOGY OF THE UPPER SMALL BOWEL. (Eng.) Dickman, M. D.; Chappelka, A. R.; Schaedler, R. W. (Thomas Jefferson Univ., Phila., PA). *Am. J. Gastroenterol.* 65(1):57-62; 1976.

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1939 REVISION OF INTESTINAL BYPASS PROCEDURES. (Eng.) Cegielski, M. M.; Organ, C. H., Jr.; Saporta, J. A. (Creighton Univ. Sch. Medicine, Omaha, NB). *Surg. Gynecol. Obstet.* 142(6):829-839; 1976.

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1954 EXPERIMENTAL ISCHAEMIA OF THE SMALL INTESTINE: EFFECT OF ANTIBIOTIC AND ANTITHROMBOTIC DRUGS ON THE MUCOSAL EXCHANGE CIRCULATION (Eng.) Norlen, K.; Rentzhog, L.; Wikstrom, S. (Dept Surgery, Univ. Hosp., Uppsala, Sweden). *Acta Chir. Scand.* 141(8):780-785; 1975.

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1957 STUDIES ON SMALL INTESTINAL OBSTRUCTION: BLOOD CIRCULATION IN OBSTRUCTED AND ARTIFICIALLY DISTENDED SMALL INTESTINE IN THE CAT. (Eng.) Ohman, U. (Karolinska Sjukhuset, S-104 01 Stockholm, Sweden). *Acta Chir. Scand.* 141(Suppl. 452):1-33; 1975.

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See also, 1766, 1785, 1788, 1797, 1798, 1799, 1815, 1847, 1857, 1869, 1875, 1876, 1885, 1898, 1921, 1928, 1961, 1965, 1979, 1986, 2021, 2208, 2221, 2258, 2280, 2293.

SMALL INTESTINE

Malabsorption

1960 NON-SPECIFIC CYTOTOXICITY OF WHEAT GLIADIN COMPONENTS TOWARDS CULTURED HUMAN CELLS. (Eng.) Hudson, D. A.; Cornell, H. J.; Purdham, D. R.; Rolles, C. J. (Inst. Child Health, Nuffield Building, Francis Rd., Birmingham B16 8ET, England). *Lancet* 1(7955):339-341; 1976.

Fractions of a proteolytic digest of wheat gliadin were assayed for cytotoxic properties using cultured human embryonic intestinal, lung, kidney, adrenal, and HEp-2 cells. Separation of the gliadin digest into 10 major fractions was achieved by chromatography on SP-Sephadex C-25. In all cell types, noxious effects were observed microscopically over a 24-hr period. The most active fraction was that previously shown to produce xylose malabsorption in subjects with celiac disease, disruption of lysosomes and inhibition of morphological recovery of cultured mucosa from a patient on a gluten-free diet. The authors suggest that the demonstration of nonspecific cytotoxic properties associated with some of the products of gliadin digestion may be useful for defining the minimum chemical structure that can be produced *in vitro* that results in deleterious effects when fed to patients with celiac disease.

1961 GLUTEN-SENSITIVE ENTEROPATHY: INHIBITION BY CORTISOL OF THE EFFECT OF GLUTEN PROTEIN IN VITRO. (Eng.) Katz, A. J.; Falchuk, Z. M.; Strober, W.; Shwachman, H. (Peter Bent Brigham Hosp., 721 Huntington Ave., Boston, MA 02115). *N. Engl. J. Med.* 295(3):131-135; 1976.

To investigate the pathogenesis of gluten-sensitive enteropathy, the effect of cortisol was analyzed in cultures of jejunal specimens obtained by biopsy in 11 patients with the disease, in 1 patient with dermatitis herpetiformis and malabsorption, in 1 patient with non-gluten-sensitive gastrointestinal disease, and in 5 normal subjects. Cultures were prepared with and without gluten or cortisol (5 μM). Morphology and alkaline phosphatase activity were assessed before culture and after 24 hr. Biopsies from untreated patients cultured with gluten showed low enzyme values and cuboidal epithelial cells before and after culture. Biopsies cultured in a gluten-free medium showed a threefold increase in enzyme values ($p<0.01$) and morphologic inprovement with change to columnar epithelial cells. Cultures with gluten plus cortisol showed rises in alkaline phosphatase and morphologic improvement indistinguishable from cultures without gluten. Cortisol and gluten had no effect on cultures from appropriate controls. It is concluded that cortisol prevents the harmful effects of gluten on biopsies from patients with gluten-sensitive enteropathy *in vitro*.

1962 SPECIFIC B-CELL ANTIGENS ASSOCIATED WITH GLUTEN-SENSITIVE ENTEROPATHY AND DERMATITIS HERPETIFORMIS. (Eng.) Mann, D. L.; Nelson, D. L.; Katz, S. I.; Abelson, L. D.; Strober, W. (Natl. Cancer Inst., Building 10, Bethesda, MD 20014). *Lancet* 1(7951):110-111; 1976.

B lymphocyte antigens were investigated in 16 patients with gluten-sensitive enteropathy (GSE), in 19 patients with dermatitis herpetiformis (DH), and in 37 normal individuals to determine a relation between their presence and diseases having HLA antigen associations. Antisera containing antibodies specific for B lymphocyte antigens were obtained from the wife of a patient with DH (antisera W-1) and from the mother of two children with GSE (B-1); other antisera with B lymphocyte reactivity were also used. None of the sera tested reacted with B lymphocytes from the normal individuals, whether they were histocompatability antigen HLA-B8-positive or not. Antiserum B-1 reacted with cells from 7 of 9 HLA-B8 positive, 6 of 7 HLA-B8-negative GSE patients, 12 of 15 HLA-B8-positive, and 3 of 4 HLA-B8-negative DH patients. Antiserum W-1 reacted with cells from 8 of 9 HLA-B8-positive, all of 7 HLA-B8-negative GSE patients, all 13 of HLA-B8-positive, and both of 2 HLA-B8-negative DH patients tested. The identification of this specific antigen provides further insight into the pathogenesis of GSE and DH and may form the basis of a diagnostic test for these diseases.

1963 ATOPIC DISORDERS AND ADULT COELIAC DISEASE.

(Eng.) Hodgson, H. J. F.; Davies, R. J.; Gent, A. E.; Hodson, M. E. (Royal Free Hosp., London NW3, England). *Lancet* 1(7951):115-117; 1976.

Thirty-three patients with adult celiac disease (ACD) and two with dermatitis herpetiformis and partial villous atrophy were studied to determine a relation with serum immunoglobulin levels or with a personal or family history of atopic disorders. A control group of 36 patients with ulcers or esophagitis was also studied. There were no overall differences in serum immunoglobulin concentrations between the two groups. Nineteen of the 35 patients with ACD had detectable auto-antibodies, compared with 2 controls ($p<0.001$). There was a personal history of atopic disorders (asthma, hay fever, or atopic eczema) in 10 of the 35 patients and in 2 of the 36 controls ($p<0.05$) and a family history of atopic disorders in 18 patients and in 8 controls ($p<0.025$). There were no differences in the frequencies of positive skin tests to 23 common allergens. The association of atopic disorders with patients and relatives of patients with ACD provides further evidence that underlying immunological abnormalities may be present in celiac disease.

1964 PATTERNS OF FOOD IRON ABSORPTION IN IRON-DEFICIENT WHITE AND INDIAN SUBJECTS AND IN VENESECTED HAEMOCHROMATOTIC PATIENTS.

(Eng.) Bezwoda, W. R.; Disler, P. B.; Lynch, S. R.; Charlton, R. W.; Torrance, J. D.; Derman, D.; Bothwell, T. H.; Walker, R. B.; Mayet, F. (Univ. Witwatersrand Medical Sch., Johannesburg, South Africa). *Br. J. Haematol.* 33(3):425-436; 1976.

The absorption of radioactive iron from a solution of ferrous ascorbate, and from a standard meal containing intrinsically labeled hemoglobin and wheat, was measured in 12 Indian housewives, 18 Caucasian hospital patients, and 12 subjects with idiopathic hemochromatosis. Eight of the latter had been treated by multiple venesections, so that their serum ferritin concentrations were below 25 μg/l. Since the serum ferritin concentrations of the housewives and the hospital patients were comparable, their body iron stores were considered to be depleted to a similar degree. There were no significant differences between the absorptions of ferrous ascorbate or of the heme iron in the standard meal by each group, but the housewives and the hospital patients absorbed significantly less of the nonheme food iron. The mean nonheme food iron absorptions were 36.4%, 5.8%, and 18.9% for the treated hemochromatotic subjects, the Indian housewives, and the hospital patients, resp. The ratios between the absorption of different types of dietary iron were calculated. The mean nonheme:heme food iron absorption ratio for the group of treated hemochromatotic subjects was 0.98, and for the housewives it was only 0.18. The hospital patients did not form a homogeneous population; the ratios of the 5 men and 3 of the women were greater than 1.0, whereas those of the remaining 10 women were less than 0.5. The results suggest that malabsorption of nonheme iron from a meal containing wheat, presumably due to a defect at the luminal level, may be an important factor in the pathogenesis of iron deficiency in some subjects. The abnormality appears to be particularly prevalent among Indian woman living in Durban, South Africa.

1965 ROLE OF FAT MALDIGESTION IN PATHOGENESIS OF STEATORRHEA IN ILEAL RESECTION. FAT DIGESTION AFTER TWO SEQUENTIAL TEST MEALS WITH AND WITHOUT CHOLESTYRAMINE.

(Eng.) Poley, J. R.; Hofmann, A. F. (Dept. Pediatrics, Univ. Ulm, Ulm, Germany). *Gastroenterology* 71(1):38-44; 1976.

To clarify the role of fat maldigestion in the pathogenesis of steatorrhea in patients with ileal resection, the total and aqueous phase concentrations of bile acid and fatty acid were characterized in eight such patients (five patients with small ileal resection, bile acid diarrhea, and steatorrhea less than 20 g/day; three patients with large ileal resection, fatty acid diarrhea, and steatorrhea greater than 20 g/day) and in four healthy control subjects after a morning and afternoon liquid test meal. The study was then repeated with the administration of 4 g of cholestyramine before each meal to induce fat maldigestion. After a conventional test meal, patients with large resections and severe steatorrhea had significantly lower aqueous phase concentrations of bile acids (and fatty acids) than patients with smaller resections or control subjects, explained, in part by intraluminal precipitation of about half of the bile acids during digestion. When cholestyramine was administered before the meal, aqueous phase bile acid concentrations decreased in all patients, including the normal control subjects; the degree of fat maldigestion induced in the patients with small resections (and the control subjects) became similar to that present after the conventional test meal in the patients with large resections. Because of the small increase in steatorrhea in the patients with small resections when cholestyramine was administered continuously, these data suggest that fat maldigestion does not induce severe fat malabsorption in patients with sufficient anatomical reserve. These patients can absorb fat efficiently by utilizing the distal small intestine. In patients with large ileal resections, severe steatorrhea is explained, in part, by the combination of fat maldigestion and decreased surface area. In addition, the steatorrhea occurring in patients with small resections and relatively normal fat digestion during two test meals may be explained by impaired fat digestion, which occurs during the final and often the largest meal of the day.

1966 RELATIONSHIP BETWEEN BILE ACID MALABSORPTION AND PANCREATIC INSUFFICIENCY IN CYSTIC FIBROSIS.

(Eng.) Weber, A. M.; Roy, C. C.; Chartrand, L.; Lepage, G.; Dufour, O. L.; Morin, C. L.; Lasalle, R. (Hopital Sainte-Justine, 3175 St. Catherine Road, Montreal H3T, 1C5, Quebec, Canada). *Gut* 17(4):295-299; 1976.

The increased bile acid (BA) loss observed in untreated children with pancreatic insufficiency secondary to cystic fibrosis (CF) was further investigated in 49 untreated children with CF and in 25 normal controls. The response of a small group of CF patients to various dietary and therapeutic interventions is also reported. BA loss (mg/m^2, 24 hr) in the stools of 43 patients with CF and pancreatic insufficiency was 751.1 ± 48.3, while that of 6 CF patients without clinical evidence of pancreatic disease (133.4 ± 15.9) did not differ from values in the 25 controls (109.8 ± 9.8). There was a good correlation between the degree of BA and fat sequestration. Concomitant changes in bile acid and fat loss were observed in one group of six patients who were studied on and off pancreatic enzymes as well as in a second group of seven children who were treated with pancreatic supplements and maintained on a normal diet followed by a low fat diet supplemented with medium chain triglycerides. Administration of sodium bicarbonate (15 g/1.73 m^3 x 24 hr) for 10 days led to a significant decrease in fat loss (15.8 ± 2.7 increased to 10.3 ± 1.9) without any simultaneous change in bile acid excretion (533.1 ± 58.3 increased to 500.4 ± 58.6). Qualitative bile acid patterns in eight controls, in four infants after an ileal resection, and in four patients with CF or with celiac disease showed that the percentage of primary BA followed closely the total amount excreted, except in situations where antibiotics were administered. The exact mechanism for the increased loss of BA in CF is unknown. It is found in all age groups and is related to the presence and degree of pancreatic insufficiency. The possibility that unhydrolyzed triglycerides may interfere with the intestinal absorption of bile acid needs further confirmation.

1967 VITAMIN B_{12} ABSORPTION--A STUDY OF INTRALUMINAL EVENTS IN CONTROL SUBJECTS AND PATIENTS WITH TROPICAL SPRUE. (Eng.) Kapadia, C. R.; Bhat, P.; Jacob, E.; Baker, S. J. (Christian Medical Coll. Hosp., Vellore, India). *Gut* 16(12): 988-993; 1975.

The intraluminal fate of p.o. administered radioactive vitamin B_{12} was studied in six control subjects with normal vitamin B_{12} absorption and in eight patients with vitamin B_{12} malabsorption due to tropical sprue. In control subjects, 1-21% of the dose was bound to sedimentable material and 37-75% was bound to immunoreactive intrinsic factor. In subjects with vitamin B_{12} malabsorption due to tropical sprue, the results were identical with the control subjects. Bacteriological studies showed a statistically significant correlation between both the number of flora in the jejunum and the number of bacteroides in both the jejunum and ileum and vitamin B_{12} malabsorption. Results indicate that in patients with tropical sprue who have normal intrinsic factor secretion, the vitamin B_{12} absorptive defect is not due to binding of the vitamin to bacteria or to alteration to the intrinsic factor vitamin B_{12} complex in the intestinal lumen. The lesion appears to be one of the mucosal cell receptors or of the cells themselves, possibly caused by bacterial toxins.

1968 THE VALUE OF ORGAN CULTURE IN THE STUDY OF THE PATHOGENESIS OF CELIAC DISEASE. (Fre.) Jos, J.; Rey, J. (INSERM, Hopital des Enfants-Malades, 149, rue de Sevres, 75730 Paris Cedex 15, France). *Arch. Fr. Mal. App. Dig.* 64(6): 461-464; 1975.

1969 HIGH INTESTINAL LACTASE CONCENTRATION IN ADULT PAKISTANIS [ABSTRACT]. (Eng.) Rab, S. M.; Baseer, A. (Jinnah Postgraduate Medical Center, Karachi-35, Pakistan). *Br. Med. J.* 1(6007): 436; 1976.

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1973 HYPERTHYROIDISM AND COELIAC SPRUE: A SIMPLE ASSOCIATION? (Eng.) Celle, G.; Dodero, M.; Fresco, C. (Istituto Scientifico di Medicina Interna, Univ. Genova, Italy). *Acta Hepatogastroenterol. (Stuttg.)* 23(1):68-71; 1976.

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1977 PRIMARY TREHALOSE MALABSORPTION. (Dan.) Gudmand-Hoyer, E.; Krasilnikoff, P. A.

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(Kobenhavns amts sygehus i Gentofte, Gentofte, Denmark). *Ugeskr. Laeger.* 137(28):1586; 1975.

1978 DISACCHARIDE MALABSORPTION: CLINICAL AND DIAGNOSTIC PROBLEMS. (Ger.) Gudmand-Hoyer, E. (Kobenhavns amts sygehus i Gentofte, Niels Andersons Vej 65, DK-2900 Hellerup, Denmark). *Med. Klin.* 71(7):261-266; 1976.

1979 DISACCHARIDASES OF THE SMALL INTESTINAL MUCOSA IN INFANTS AND CHILDREN. (Ger.) Niessen, K. H.; Schmidt, K.; Brugmann, G. (Univ.-Kinderklinik, D-7400 Tubingen, Rumelinstrasse 23, W. Germany). *Z. Gastroenterol.* 13(6):565-572; 1975.

1980 THROMBOCYTOSIS IN PATIENTS WITH CELIAC SPRUE. (Eng.) Nelson, E. W.; Ertan, A.; Brooks, F. P.; Cerda, J. J. (Univ. Florida Health Center, Box J-214, Gainesville, FL 32610). *Gastroenterology* 70(6):1042-1044; 1976.

See also, 1557, 1630, 1776, 1940, 2256.

LARGE INTESTINE

1981 COLITIS ASSOCIATED WITH ORAL CLINDAMYCIN THERAPY. A CLINICAL STUDY OF 16 PATIENTS. (Eng.) Hoberman, L. J.; Eigenbrodt, E. H.; Kilman, W. J.; Hughes, L. R.; Norgaard, R. P.; Fordtran, J. S. (7711 Louis Pasteur Drive, Suite 409, San Antonio, TX 78229). *Am. J. Dig. Dis.* 21(1):1-17; 1976.

The clinical, radiologic, and histologic features of 16 patients hospitalized with clindamycin-associated colitis are presented. The findings were tabulated and compared to 33 cases reported in the literature. The majority of patients were females over 40 yr of age. The clinical presentation varied from mild persistent diarrhea to acute surgical abdomen. Proctoscopic examination revealed nonspecific colitis in nine and pseudomembranous colitis in seven cases. No specific radiologic or histologic findings for postantibiotic colitis were found. Therapy was nonspecific and varied according to the severity of the clinical course. Clinically, there appeared to be some benefit from systemic steroid therapy. Four patients died. During follow-up evaluation, none of the recovered patients had spontaneous relapses without medication. The pathogenic mechanism for postantibiotic colitis secondary to clindamycin remains unknown and does not appear dose-related. Clindamycin therapy should be limited to disorders with specific indications.

1982 COLLAGENOUS COLITIS WITH WATERY DIARRHOEA--A NEW ENTITY? (Eng.) Lindstrom, C. G. (Malmo General Hosp., Malmo, Sweden). *Pathol. Eur.* 11(1):87-89; 1976.

The case of a 48-yr-old woman with chronic watery diarrhea associated with an unusual rectal mucosa is described. Proctoscopy showed a macroscopically normal mucosa, but biopsy showed a thick subepithelial collagenous deposit. This deposit was of the same type as that described in the jejunal mucosa in collagenous sprue, and it seemed to be the cause of the diarrhea. It is proposed that the term "collagenous colitis or proctocolitis" be used to describe this disease.

1983 FAMILIAL "MINOR" ADENOMATOUS POLYPOSIS COLI ASSOCIATED WITH GASTRIC CARCINOMA--A HITHERTO UNDESCRIBED PHENOTYPE OF POLYPOSIS COLI? (Eng.) Ammann, R. W.; Deyhle, P.; Sulser, H. (Kantonsspital, CH-8091 Zurich, Switzerland). *Scand. J. Gastroenterol.* 11(3):233-240; 1976.

A clinical study of a family with a high incidence of death from gastric cancer in the second generation is presented. Endoscopic and/or surgical evaluation of the stomach, upper small intestine, and colon in 14 mainly asymptomatic members of the third and fourth generations revealed single or multiple (solitary) papillary adenomas in the colon or jejunum in 2 members each of the 2 generations. In addition, single or multiple hyperplastic polyps in the stomach or colon were found in five members, in four of them in association with papillary adenomas. The findings in the family are consistent with "minor" adenomatous polyposis coli associated with gastric carcinoma. Gastric carcinoma probably represents another phenotype among the variety of extracolonic and extra-alimentary neoplastic changes known to occur in association with familial polyposi coli. The relation of hyperplastic polyps to papillary adenoma in the colon and to gastric carcinoma, resp., is discussed.

1984 VOLVULUS OF THE RIGHT COLON: A REVIEW OF 30 CASES WITH SPECIAL REFERENCE TO LATE RESULTS OF VARIOUS SURGICAL PROCEDURES. (Eng.) Halvorsen, J. F.; Semb, B. H. K. (Haukeland sykehus, Univ. Bergen, Bergen, Norway). *Acta Chir. Scand.* 141(8):804-809; 1975.

Thirty patients who received different types of treatment for volvulus of the right colon during a

26-yr period are reviewed. Five patients died from unrelated causes during the follow-up period. Six patients did not receive surgery and had repeated attacks of transient bowel obstruction, not requiring hospitalization. Right hemicolectomy was performed in nine patients; one died of peritonitis postoperatively, and the remaining patients had no recurrence. Detorsion was performed in nine patients; of seven living patients, three are asymptomatic. Two patients treated with detorsion and cecostomy died during the early postoperative period. In four living patients in whom detorsion and cecopexy were performed, three remain asymptomatic, and no mortality was associated with this procedure.

1985 PEDUNCULATED MALIGNANT COLONIC POLYPS WITH SUPERFICIAL INVASION OF THE STALKS. (Eng.) Smith, T. R. (Albert Einstein Coll. Medicine, Bronx, NY 10461). *Radiology* 115(2):593-596; 1975.

1986 CURRENT CONCEPTS IN GENETICS: INHERITED GASTROINTESTINAL-POLYPOSIS SYNDROMES. (Eng.) Erbe, R. W. (Massachusetts General Hosp., Boston, MA 02114). *N. Engl. J. Med.* 294(20): 1101-1104; 1976.

1987 ANASTOMOTIC RECURRENCE AFTER ANTERIOR RESECTION FOR CARCINOMA: LAHEY CLINIC EXPERIENCE. (Eng.) Manson, P. N.; Corman, M. L.; Coller, J. A.; Veidenheimer, M. C. (Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215). *Dis. Colon Rectum* 19(3):219-224; 1976.

1988 A "MODIFIED WHITEHEAD" HEMORRHOIDECTOMY. (Eng.) Burchell, M. C.; Thow, G. B.; Manson, R. R. (120 La Casa Via, Walnut Creek, CA 94598). *Dis. Colon Rectum* 19(3):225-232; 1976.

1989 THE IMMUNOTHERAPY OF ANAL CONDYLOMA ACUMINATUM. (Eng.) Abcarian, H.; Smith, D.; Sharon, N. (Cook County Hosp., 1825 West Harrison St., Chicago, IL 60612). *Dis. Colon Rectum* 19(3): 237-244; 1976.

1990 NONSUTURE COLONIC ANASTOMOSIS. (Eng.) Gennaro, A. R.; Moreira, C. A. X. (Temple Univ. Health Sciences Center, 3401 North Broad St., Philadelphia, PA 19140). *Dis. Colon Rectum* 19(3): 245-249; 1976.

1991 PLAIN-FILM FINDINGS IN SEVERE PSEUDOMEMBRANOUS COLITIS. (Eng.) Stanley, R. J.; Melson, G. L.; Tedesco, F. J.; Saylor, J. L. (Mallinckrodt Inst. Radiology, 510 S. Kingshighway, St. Louis, MO 63110). *Radiology* 118(1):7-11; 1976.

1992 NEONATAL STAPHYLOCOCCAL ENTEROCOLITIS: ASSOCIATION WITH INDWELLING FEEDING CATHETERS AND S. aureus COLONIZATION. (Eng.) Gutman, L. T.; Idriss, Z. H.; Gehlbach, S.; Blackmon, L. (Duke Univ. Medical Center, Box 3971, Durham, NC 27710). *J. Pediatr.* 88(5):836-839; 1976.

1993 DRUG-INDUCED PSEUDOMEMBRANOUS ENTEROCOLITIS: A NEW ETIOLOGIC AGENT. (Eng.) Slagle, G. W.; Boggs, H. W., Jr. (865 Margaret Place, Shreveport, LA 71101). *Dis. Colon Rectum* 19(3):253-255; 1976.

1994 ON COMPLICATIONS OF COLONOSCOPY PERFORMED WITH GENERAL ANESTHESIA. (Eng.) Livstone, E. M. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Gastrointest. Endosc.* 22(1):50; 1975.

1995 EVALUATION OF THE BARIUM-ENEMA EXAMINATION AND COLONOSCOPY IN DIAGNOSIS OF COLONIC CANCER. (Eng.) Kronborg, O.; Ostergaard, A. (Bispebjerg Hosp., Copenhagen, Denmark). *Dis. Colon Rectum* 18(8):674-677; 1975.

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1997 ENDOSCOPIC EXTRACTION OF AN UNUSUAL COLONIC FOREIGN BODY. (Eng.) Richter, R. M.; Littman, L. (Jewish Hosp., 555 Prospect Place, Brooklyn, NY 11238). *Gastrointest. Endosc.* 22(1): 40; 1975.

1998 EVALUATION OF ENDOSCOPIC EXAMINATION OF COLON TUMORS IN RATS. (Eng.) Narisawa, T.; Wong, C.-Q.; Weisburger, J. H. (Naylor Dana Inst. Disease Prevention, American Health Foundation, Valhalla, NY 10595). *Am. J. Dig. Dis.* 20(10):928-934; 1975.

1999 ENDOSCOPY OF URETEROINTESTINAL CONDUITS AND RETROGRADE PYELOGRAPHY. (Eng.) Falkenstien, D. B.; Reich, C. B.; Golimbu, M. N.; Warner, R. S.; Morales, P. Z.; Zimmon, D. S. (Manhattan Veterans Admin. Hosp., 408 First Ave., New York, NY 10010). *Gastrointest. Endosc.* 22(1):24-26; 1975.

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F. (Chirurgische Klinik, Kantonsspital, CH-8596 Munsterlingen, Switzerland). *Helv. Chir. Acta* 42(5/6):851-855; 1975.

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2023 ONE CASE OF SPONTANEOUS REPTURE OF THE RECTUM. (Fre.) Rosello, E.; Andres, A.; Masdevall, C.; Boque, R. (Sant Andreu 46, Barcelona 16, Spain). *Lyon Chir.* 71(6):434; 1975.

2024 INTESTINAL BLEEDING FROM A MALIGNANT CARCINOID TUMOR OF THE COLON. (Fre.) Bekhti, A. (Hopital de Baviere, Boulevard de la Constitution 66, B-4020 Liege, Belgium). *Acta Gastroenterol. Belg.* 39(1/2):61-66; 1976.

2025 CARCINOID TUMORS OF THE RECTUM. (Fre.) Sicard, J. L.; Schapiro, R.; Flabeau, F. (Service de Chirurgie, Hopital Tenon, 4, rue de la Chine, 75970 Paris Cedex 20, France). *Nouv. Presse Med.* 5(1):23-24; 1976.

2026 NONSPECIFIC INFLAMMATORY TUMORS OF THE LARGE INTESTINE. (Pol.) Dzwonkowski, J.; Buszek, A.; Korszun, J. (Wielospecjalistyczny Szpital, 61-546 Poznan, ul. Jerzego 15b m. 5, Poland). *Pol. Przegl. Chir.* 47(5):617-620; 1975.

2027 VARICES OF THE COLON: DIAGNOSIS BY COLONOSCOPY. (Eng.) Geboes, K.; Broeckaert, L.; Vantrappen, G. (Univ. Hosp., St. Rafael, Leuven, Belgium). *Gastrointest. Endosc.* 22(1):43-45; 1975.

See also, 1743, 1767, 1768, 1779, 1781, 1783, 1784, 1794, 1809, 1869, 1876, 1928, 1934, 1936, 1939, 1947, 1952, 1955, 1958, 2029, 2033, 2073, 2088, 2104, 2241, 2257, 2280, 2281, 2282, 2287, 2304, 2307, 2308, 2309.

LARGE INTESTINE

Ulcerative Colitis

2028 HISTOLOGICAL APPRAISAL OF ULCERATIVE COLITIS IN FIBREOPTIC COLONOSCOPE BIOPSY SPECIMENS. (Eng.) Lee, S. K.; Fung, W. P. (Dept. Pathology, Univ. Singapore, Outram Road, Singapore 3). *Med. J. Aust.* 63(1/2):8-11; 1976.

On the basis of 157 colonoscopic biopsies taken from 38 patients with endoscopic appearances of ulcerative colitis, the histological changes of the disease are described, and a histological classification is proposed. The classification is as follows: (a) active chronic phase without ulceration, (b) active chronic phase with ulceration, (c) quiescent chronic phase, (d) healed chronic phase, and (e) precancerous phase. Three degrees of severity (mild, moderate, and severe) are recognized for each phase. The classification is sufficiently flexible to allow recognition of the various stages of the disease process. It is suggested that it be adopted for the clinical management of patients and for future investigations into the etiology and other aspects of ulcerative colitis.

2029 ENTEROCHROMAFFIN CELLS AND MACROPHAGES IN ULCERATIVE COLITIS AND IRRITABLE COLON. (Eng.) Ahonen, A.; Kyosola, K.; Penttila, O. (Dept. Anatomy, Univ. Helsinki, Siltavuorenpenger 20, SF-00170 Helsinki 17, Finland). *Ann. Clin. Res.* 8(1): 1-7; 1976.

The type and the number of fluorescent cells were studied in rectal biopsies from six patients with ulcerative colitis, six patients with irritable colon, and nine controls. The specimens were studied by formaldehyde-induced fluorescence after freeze-drying and Epon embedding. The mean number of enterochromaffin cells per crypt was increased over that of the controls in five patients with irritable colon, whereas the patients with ulcerative colitis had fewer enterochromaffin cells than did the controls. There were autofluorescent macrophages in almost every biopsy specimen, and various types of autofluorescent granules were observed in the cytoplasm. The results confirm previous studies that indicate that the number of enterochromaffin cells is decreased in ulcerative colitis.

2030 EVIDENCE OF AN AGENT TRANSMISSIBLE FROM ULCERATIVE COLITIS TISSUE. (Eng.) Cave, D. R.; Mitchell, D. N.; Brooke, B. N. (St. George's Hosp., London, England). *Lancet* 1(7973):1311-1314; 1976.

Five New Zealand white rabbits were injected intracolonically with homogenates (100 μm) of ulcerative colitis tissue to study the possibility of a transmissible agent in this tissue. Histological changes similar to those seen in the human donors were present in the mucosa and submucosa of the large in-

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testine of 4 of these rabbits, 3-12 months later. Similar changes were seen in the large intestine of 3 of 4 rabbits, 6-13 months after i.v. or intracolonic inoculation of homogenates of rabbit mesenteric lymph nodes after passage of human ulcerative colitis tissue (100 μm or 0·2 μm). Three of 30 A_2G strain mice, which were injected with similar tissue homogenates (100 μm or 0·2 μm) from patients with ulcerative colitis, into the footpad or i.p., had granulomatous changes in footpad, bowel, liver, and/or spleen, 3-22 months later. Such changes did not develop in rabbits or mice inoculated with tissue from normal controls. The results suggest that a transmissible factor is involved in the etiology of ulcerative colitis.

2031 IMPLICATIONS OF PRECANCEROUS RECTAL BIOPSY IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE. (Eng.) Gewertz, B. L.; Dent, T. L.; Appelman, H. D. (Univ. Michigan Medical Center, Ann Arbor, MI 48104). *Arch. Surg.* 111(4):326-329; 1976.

Retrospective studies were undertaken in 65 patients with an initial diagnosis of ulcerative colitis who underwent total proctocolectomy between 1955 and 1973. Rectal mucosa in each patient was examined microscopically for the presence or absence of "precancerous" alterations. Histologic examination was made without knowledge of concomitant colon carcinoma or the patients' clinical courses. Three of 10 patients with precancerous rectal mucosa had invasive colon carcinoma, while none of the 55 patients without such changes had colon cancer. The duration of disease was significantly greater in those patients with rectal precancer ($p<0.05$). Reexamination changed the pathologic diagnosis in 15 patients from ulcerative colitis to granulomatous or "mixed" colitis. Two of three invasive cancers occurred in the reclassified group. The results indicate that careful histologic evaluation of rectal biopsy specimens from individuals with inflammatory bowel disease may better define that population of patients with an increased risk of colonic carcinoma.

2032 ULCERATIVE COLITIS AND UNETHICAL RESEARCH. (Dan.) Strande, C. S. (No affiliation given). *Ugeskr. Laeger.* 137(29):1667-1668; 1975.

2033 INDICES OF PROTEIN METABOLISM AND FUNCTIONAL STATE OF THE LIVER IN PATIENTS SUBJECTED TO COLECTOMY. (Rus.) Brusilovsky, M. I.; Chernomordik, A. E.; Chernyshova, N. N. (Scientific Res. Lab. Proctology, Moscow, USSR). *Khirurgiia* (1):91-94; 1975.

2034 WATER AND SALT TURNOVER IN PATIENTS WITH UNSPECIFIC ULCERATIVE COLITIS. (Rus.) Brandina, A. M.; Ilysheva, G. N.; Chernomordik, A. E.; Levitan, M. Kh. Brusilovskii, M. I.; Oleinikov, P. N. (Scientific Res. Inst., Russian SSR Ministry Health, Moscow, USSR). *Klin. Med.* 53(10):64-67; 1975

2035 INFLAMMATORY DISORDERS OF THE INTESTINE: ULCERATIVE COLITIS AND CROHN'S DISEASE. EARLY RECOGNITION, DIAGNOSIS AND THERAPY. (Ger.) Belohlavek, D.; Koch, H.; Morl, M. (Med. Univ.-Klinik, Krankenhausstrasse 12, 852 Erlangen, Germany). *Fortschr. Med.* 94(7):358-362; 1976.

2036 STUDIES ON THE CYTOTOXICITY OF LYMPHOCYTES IN ULCERATIVE COLITIS. (Ger.) Kovacs, A.; Onody, K.; Petranyi, Gy. (I. Medical Clinic, Semmelweiss Univ., H-1083 Budapest VIII, Koranyi Sandor u. 2a, Hungary). *Z. Gastroenterol.* 13(6):573-576; 1975.

2037 HEPATORENAL FAILURE IN ACUTE ULCERATIVE COLITIS. (Pol.) Badowski, A.; Daciewicz, Z. (Centrum Ksztalcenia Podypl. WAM, ul. Szaserow 128, 04-349 Warsaw, Poland). *Wiad. Lek.* 28(12):1061-1063; 1975.

2038 ULCERATIVE COLITIS ASSOCIATED WITH HYPERTROPHIC OSTEROARTHROPATHY. (Eng.) Farman, J.; Twerksy, J.; Fierst, S. (Downstate Medical Center, 450 Clarkson Ave., Brooklyn, NY 11203). *Am. J. Dig. Dis.* 21(2):130-135; 1976.

2039 ULCERATIVE COLITIS AND THE SKIN. (Eng.) Basler, R. S. W.; Dubin, H. V. (Davis-Monthan Air Force Base, Tucson, AZ). *Arch. Dermatol.* 112(4):531-534; 1976.

2040 TURNER SYNDROME AND INFLAMMATORY BOWEL DISEASE. (Eng.) Weinrieb, I. J.; Fineman, R. M.; Spiro, H. M. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *N. Engl. J. Med.* 294(22):1221-1222; 1976.

See also, 2003, 2278, 2312.

2041 MORPHOLOGICAL LESIONS ASSOCIATED WITH HUMAN PRIMARY INVASIVE NONENDOCRINE PANCREAS CANCER. (Eng.) Cubilla, A. L.; Fitzgerald, P. J. (Memorial Hosp., 1275 York Ave., New York, NY 10021). *Cancer Res.* 36(7):2690-2698; 1976.

Pancreatic duct epithelium was studied in 227 cases of human pancreatic cancer (100 pancreatectomy specimens and 127 autopsies) and in 100 age- and sex-matched control nonpancreatic cancer cases, to determine the prevalence of the lesions and their possible precursor relation to invasive pancreas cancer. The prevalence of squamous metaplasia, pyloric gland metaplasia, mucous hypertrophy, and focal epithelial hyperplasia was not significantly different in the two groups. Ductal papillary hyperplasia was three times more prevalent in patients with pancreas cancer than in controls. Marked atypia occurred in 20% and carcinoma *in situ* in 18% of the pancreas cancer cases, but neither change was seen in the control cases. It is possible that focal epithelial hyperplasia was a precursor change but that it was overgrown by the cancer. Papillary hyperplasia could not be properly evaluated as a precursor lesion because of duct obstruction, but practically all cases of marked atypia and carcinoma *in situ* occurred in papillary lesions. Marked atypia and carcinoma *in situ*, by analogy to other cancers, appear to be precursor lesions, and their presence in association with invasive cancer supports the possibility that there is a significant, recognizable *in situ* phase of the disease prior to the occurrence of invasive cancer.

2042 DUODENAL JUICE EXAMINATION AND SE-75-METHIONINE ELIMINATION IN PANCREATIC DAMAGE (2°). (Eng.) Scortecci, V.; Poma, S.; Micucci, E. (Istituto di Patologia Chirurgica II dell'Universita degli Studi di Milano, Milan, Italy). *Chir. Gastroenterol.* 9(1):101-103; 1975.

The elimination of ^{75}Se-methionine as a tracer of pancreatic function was studied in 17 patients, using double hormonal stimulation (secretin and pancreozymin). The cases included acute, chronic, recurrent, and sclerosing pancreatitis, chronic gastritis, cholelithiasis, bile duct carcinoma, cirrhosis, duodenal ulcer, appendicitis, bile duct lithiasis, papillary sclerosis, and chronic pancreatitis bile duct stone. Tracer excretion appeared early and peaked at 10 min; the tracer appeared very rapidly (1-2 min) in the pancreatic juice of patients with chronic pancreatitis. It is concluded that the study of ^{75}Se-methionine excretion in duodenal juice is a reliable means of determining the presence of pancreatic lesion even in the inital stage of the disease.

2043 SALIVARY AMYLASE IN DUODENAL ASPIRATES. (Eng.) Skude, G.; Ihse, I. (Malmo General Hosp., S-214 01 Malmo, Sweden). *Scand. J. Gastroenterol.* 11(1):17-20; 1976.

The significance of the contamination of pancreatic amylase by salivary amylase, occuring during the collection of duodenal aspirates for pancreatic function tests, was investigated. Salivary and pancreatic isoamylases in duodenal aspirates obtained from 47 pancreatic function tests in 45 subjects, after test meal stimulation, were separated by agarose gel electrophoresis. Salivary amylase was found to be a constituent of the duodenal aspirates in over 75% of the tests. The mean relative contribution of salivary amylase to the total amylase activity of the aspirates varied from about 15% in 20 normal subjects to about 40% in patients with chronic pancreatitis and pancreatic carcinoma. The amount of salivary amylase varied widely not only between the individuals but also within the samples of the same test series. Specific determination of the pancreatic isoamylases instead of determination of the total amylase increased the discrimination between normals and patients with pancreatic dysfunction. This study indicates that amylase should be fractionated quantitatively into pancreatic and salivary components or that other enzymes should be used to reflect pancreatic function.

2044 DIETARY EFFECTS IN THE EARLY RECOVERY PHASE OF KWASHIORKOR. (Eng.) Persson, B.; Habte, D.; Sterky, G. (St. Goran's Children's Hosp., Box 12500, S-11281 Stockholm, Sweden). *Acta Paediatr. Scand.* 65(3):329-336; 1976.

The effect on lipid metabolism of 2 isocaloric diets, synthetic monomolecular (Vivonex) and standard (Casilan), was studied in 21 children with kwashiorkor during the first weeks of rehabilitation. Before treatment, mean fasting values of all biochemical parameters were within normal ranges except for moderately elevated triglycerides (0.39-3.49 mmol/l) and low insulin. Free fatty acid (FFA) levels correlated with glycerol, D-β-hydroxybutyrate, and triglyceride values. During treatment, insulin, glucose, and glycerol remained essentially unchanged and were similar in both dietary groups. In the Vivonex group only, there was an initial marked, parallel fall of FFA and D-β-hydroxybutyrate, suggesting greater availability of carbohydrate and enhanced glucose utilization. This pattern of response occurred without comparable inhibition of lipolysis. Triglycerides, like serum albumin, increased faster in the Casilan group. The highest mean triglyceride value was reached by day 8 in the Casilan group and by day 15 in the Vivonex group. Ten min following heparin injection, triglycerides declined, and FFA and glycerol increased, indicating release of *in vivo* active lipase. Lipoprotein lipase (LPL) activity, assayed *in vitro* was similar and unaffected by 2 weeks of dietary treatment in both groups. LPL activity was inversely correlated to triglycerides, providing another possible explanation for the wide variations seen in circulatory triglycerides.

2045 SURGICAL MANAGEMENT OF PANCREATIC TRAUMA. (Eng.) Balasegaram, M. (General Hosp., Kuala Lumpur, Malaysia). *Am. J. Surg.* 13(5):536-540; 1976.

2046 SURGICAL MANAGEMENT OF ADVANCED CANCER OF THE PANCREAS, LIVER, AND BILE DUCTS. (Nor.) Liavag, I. (Det Medisinske fakultet, Universitetet i Oslo, Oslo, Norway). *Tidsskr. Nor. Laegeforen.* 95(23):1295-1297; 1975.

2047 MEDICAL AND DIETETIC STUDY OF 122 CASES OF PARTIAL AND TOTAL PANCREATECTOMY AT THE FORCILLES CENTER. (Fre.) Marseille, P. (Centre medico-dietetique, Forcilles-Ferolles, 77-Attily, France). *Prog. Med.* 103(7):221-231; 1975.

2048 EARLY REOPERATIONS AFTER SURGERY ON THE PANCREAS AND GALLBLADDER. (Fre.) Rohner, A. (Clinique universitaire de chirurgie, Hopital cantonal, CH-1211 Geneva, Switzerland). *Helv. Chir. Acta* 42(5/6):845-850; 1975.

2049 TREATMENT OF EXOCRINE PANCREATIC INSUFFICIENCY WITH FUNGAL LIPASE. (Ger.) Pointner, H.; Flegel, U. (I. Medizinische Universitatsklinik, Spitalgasse 23, A-1097 Vienna, Austria). *Arzneim. Forsch.* 25(11):1833-1835; 1975.

2050 AGE-DEPENDENT CHARACTERISTICS OF THE ENDOCRINE FUNCTION OF THE PANCREAS DURING SECRETIN AND PANCREOZYMIN STIMULATION. (Rus.) Korkushko, O. V.; Tereshchenko, V. P. (Inst. Gerontology, USSR Acad. Medical Sciences, Kiev, USSR). *Klin. Med.* 53(11):61-65; 1975.

2051 NEW CONCEPTS ON THE PANCREATIC EXOCRINE FUNCTION: PANCREATIC HYPERSECRETION. (Rus.) Dreiling, D. A.; Grinshetin, A. Dzh.; Bordalo, O. (Mount Sinai Coll. Medicine, New York, NY). *Ter. Arkh.* 47:34-38; 1975.

2052 LARGE INBORN PANCREATIC CYST IN A 16-MONTH-OLD INFANT. (Pol.) Nartowicz, A.; Nowicka, Cz.; Piotrowski, M.; Kasprzak, S. (Szpital Dzieciecy, Ul. Architektow 8 m. 13., 85-804 Bydgoszcz, Poland). *Wiad. Lek.* 28(14):1225-1226; 1975.

2053 PSEUDOCYSTS OF THE PANCREAS. (Eng.) Thompson, A. G. (Montreal General Hosp., 1650 Cedar Ave., Montreal, PQ H3G 1A4, Canada). *Can. J. Surg.* 19(3):196-200; 1976.

2054 DIFFICULTIES IN THE INVESTIGATION OF NEOPLASMS OF THE PANCREAS, GALLBLADDER, AND BILE DUCTS. (Rus.) Khudachek, Z. (Radiological Clinic, Plzen, Czechoslovakia). *Med. Radiol. (Mosk.)* 20(8):30-34; 1975.

2055 ISLET CELL TUMORS AND THE ALIMENTARY TRACT: FOURTH WALTER B. CANNON LECTURE. (Eng.) Zollinger, R. M. (Ohio State Univ. Coll. Medicine, Columbus, OH 43210). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 126(5):933-940; 1976.

See also, 1644, 1773, 1782, 1789, 1791, 1793, 1803, 1808, 1810, 1966, 2063, 2221, 2257, 2280, 2294.

PANCREAS

Pancreatitis

2056 PERCUTANEOUS PUNCTURE OF PANCREATIC CYSTS GUIDED BY ULTRASOUND. (Eng.) Hancke, S.; Pedersen, J. G. (Gentofte Hosp., Hellerup, Denmark). *Surg. Gynecol. Obstet.* 142(4):551-552; 1976.

A method for percutaneous puncture of pancreatic cysts, using ultrasound, is presented. Fifteen pancreatic cysts in 14 patients were successfully punctured percutaneously under the guidance of ultrasonic B scanning. The cysts were 3-20 cm in diameter. Only one patient had any complications; a 200-ml hematoma was discovered between the liver and stomach, during laparotomy, 3 months after the procedure. Ultrasonically guided percutaneous puncture of pancreatic cysts appears to be a simple procedure for verifying ultrasonic diagnosis, for decompression in the case of threatening rupture, and for allowing time for maturation of the cyst membrane before surgical intervention. The fact that two patients were without a recurrence after 12 months may indicate the possibility of definitive therapy using this technique.

2057 PANCREATIC ASCITES IN THE FIRST YEAR OF LIFE. (Eng.) Rubaltelli, F. F.; Barbato, A.; Guglielmi, M. (Univ. Padova Sch. Medicine, 35100 Padova, Italy). *Helv. Paediat. Acta* 30(6):515-520; 1975.

2058 PHOSPHOLIPIDS OF THE BLOOD AND THE LIVER OF ALBINO RATS AT VARIOUS STAGES OF DEVELOPMENT OF EXPERIMENTAL PANCREATITIS. (Rus.) Karagezian, K. G.; Simavorian, P. S.; Ovakimian, S. S.; Babok, Iu. V. (Inst. Biochemistry, Armenian SSR Acad. Sciences, Erevan, USSR). *Biull. Eksp. Biol. Med.* 80(7):45-49; 1975.

2059 LYMPHOCYTE TRANSFORMATION TEST AS A DIAGNOSTIC TOOL FOR CHRONIC PANCREATITIS. (Ger.) Schutt, C.; Friemel, H.; Schulze, H.-A.; Leithausser, W.; Zubaidi, G. (Klinik fur Innere Medizin, Universitat Rostock, E. Germany). *Z. Gesamte Inn. Med.* 30(12):412-415; 1975.

2060 RECURRENT SUBACUTE PANCREATITIS AND ROENTGENOGRAPHY OF THE DUCTUS PANCREATICUS. (Fre.) Lagadec, B.; Firouze-Abadie, H.; Fagniez, P.-L.; van Haecke, P. (9, av. Daniel Lesueur, 75007 Paris, France). *Sem. Hop. Paris* 50(41):2548-2550; 1974.

2061 CONTROLLED STUDY OF APROTININ IN THE TREATMENT OF ACUTE PANCREATITIS. (Fre.) Trapnell, J.-E. (Royal Victoria Hosp., Bournemouth, England). *Ann. Chir.* 30(3):201; 1976.

2062 HOW I TREAT ACUTE PANCREATITIS. (Eng.) Anderson, M. C. (Medical Coll. Ohio, Box 6190, Toledo, OH 43614). *Can. J. Surg.* 19(3):194-196; 1976.

2063 ACUTE PANCREATITIS IN A SEQUESTRATION PHASE. (Rus.) Filin, V. I.; Spasskaia, M. G.; Chumak, P. Ia. (I. I. Dzhanelidze Leningrad Scientific Res. Inst. First Aid, Leningrad, USSR). *Vestn. Khir.* 115(7):26-31; 1975.

2064 PAINLESS PANCREATITIS: ANALYSIS OF SIX CASES WITH PATHOANATOMICAL REFERENCES. (Ita.) Rambaldi, M.; Russo, R.; Rotiroti, D.; Iaquinto, G.; Siciliano, A.; Agozzino, L. (Insegnamento di Clinica medica e Terapia generale, I Facolta dell'Universita, Naples, Italy). *Recent Prog. Med. (Roma)* 59(1):61-81; 1975.

2065 DIAGNOSIS OF CHRONIC PANCREATITIS. (Ita.) Gullo, L.; Fontana, G. (Istituto di Clinica medica e Gastroenterologia, Universita, Bologna, Italy). *Recent Prog. Med. (Roma)* 59(2):113-122; 1975.

2066 DO GALLSTONES CAUSE PANCREATITIS? (Eng.) Poncelet, P. R. (Centre Hospitalier Universitaire, Quebec, PQ HOS 1NO, Canada). *Can. J. Surg.* 19(3):191-192; 1976.

2067 PROPHYLAXIS AND THERAPY OF POSTOPERATIVE PANCREATITIS. (Rus.) Grigorian, A. V.; Lutsevich, E. V.; Gostishchev, V. K.; Tolstykh, P. I. (I. M. Sechenov 1st Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (1):120-124; 1976.

2068 POSTOPERATIVE PANCREATITIS. (Ger.) Eichfuss, H. P.; Reck, R.; Rehner, M.; Soehendra, N. (Chirurgische Universitatsklinik Hamburg, Hamburg, W. Germany). *Z. Gastroenterol.* 13(6):577-582; 1975.

See also, 1770, 1772, 1773, 1789, 1806, 1808, 2042, 2047, 2048, 2050, 2053.

LIVER AND BILIARY TRACT

2069 SAMPLING INTESTINAL CONTENT WITH A SEQUESTERING CAPSULE: A NONINVASIVE TECHNIQUE FOR DETERMINING BILE ACID KINETICS IN MAN. (Eng.) Hoffman, N. E.; LaRusso, N. F.; Hofmann, A. F. (Dept. Medicine, Univ. Melbourne, Melbourne, Australia). *Mayo Clin. Proc.* 51(3):171-175; 1976.

A noninvasive technique for determining bile acid kinetics by isotope dilution in man is described. It features the i.v. injection of a radiolabeled bile acid, together with daily p.o. administration of capsules of dialysis membrane containing cholestyramine and colored beads for dating. The cholestyramine traps conjugated bile acids during transit of the small intestine. Capsules are recovered from stool by a sieving method; sequestered bile acid is eluted, conjugated bile acids are isolated chromatographically, and their specific activity is determined. The precision and validity of this sequestering capsule technique were assessed by comparing the specific activity decay curve of chenodeoxycholyl conjugates obtained from capsule samples with that obtained from duodenal samples in seven healthy volunteers in whom the bile acid pool was labeled with $[^{14}C]$chenodeoxycholic acid. Estimates of pool size by the two methods correlated well ($r=0.98$), as did the daily fractional turnover rate ($r=0.96$). The mean percentage differences for the kinetic parameters of pool size (8.3 ± 13.6), fractional turnover rate (-15.2 ± 11.5), and synthesis rate (-4.3 ± 11.4) were small, indicating that the noninvasive method is valid. However, agreement between simultaneously administered capsules was only fair, especially when the amount of bile acid trapped was small. It is suggested that the precision of the capsule technique may be less than that of the con-

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ventional sampling technique; the latter probably obtains a more valid sample of the bile acid pool.

2070 EFFECT OF ASPIRIN ON LIVER TESTS IN PATIENTS WITH RA OR SLE AND IN NORMAL VOLUNTEERS.

(Eng.) Seaman, W. E.; Plotz, P. H. (Massachusetts General Hosp., Boston, MA). *Arthritis Rheum.* 19(2):155-160; 1976.

The effects of aspirin on the liver were evaluated in a prospective study of 20 patients with rheumatoid arthritis (RA), 16 patients with systemic lupus erythematosus (SLE), and 3 normal volunteers. Effects were also assessed in a retrospective study of 80 patients with SLE. The subjects were given 50 mg/kg/day of aspirin (4 times daily); this dose was raised by 640 mg every other day until a morning serum salicylate level of 25-30 mg/100 ml was achieved. The dosage was then adjusted to this level for 2 weeks. Four RA patients, seven SLE patients, and one normal subject developed elevated transaminases. This occurred at or near the end of the 2-week study period in the RA patients. Elevated transaminases were most frequent and of most rapid onset in patients with clinically active SLE. Elevations in blood urea nitrogen occurred in four patients with SLE. In the retrospective study, undertaken over a 2.5-yr period, 19 of the 80 patients showed elevated transaminase levels. The aspirin dosage associated with these abnormalities ranged from 640 mg/day to 5,760 mg/day. It appears that salicylates are mildly hepatotoxic in some persons, and this may be augmented by SLE and perhaps by other illnesses.

2071 ALTERATIONS IN TISSUE FERRITINS IN IRON STORAGE DISORDERS.

(Eng.) Powell, L. W.; McKeering, L. V.; Halliday, J. W. (Royal Brisbane Hosp., Brisbane, Australia). *Gut* 16(11):909-912; 1975.

Purified tissue ferritins isolated from two Bantu subjects with gross hemosiderosis, from a patient with idiopathic hemochromatosis (IHC) treated by phlebotomy, from a normal subject, and from male Sprague-Dawley rats with experimental iron overload were analyzed by polyacrylamide gel electrophoresis to determine the significance of the abnormality previously demonstrated in tissue isoferritins in patients with IHC. The isoferritin profile of the tissues from the Bantu subjects and the iron-loaded rats showed an abnormality similar to that previously found in patients with untreated IHC: an abnormally uniform distribution of iron-containing isoferritins with an increase in the more basic isoferritins and an apparent absence of the more acidic ones. In contrast, tissues from the patient with treated IHC, who was iron depleted at the time of death, showed the normal organ-specific isoferritin distribution. These findings suggest that the abnormal distribution of tissue isoferritins in IHC is an acquired phenomenon and is not likely to be related to an underlying genetic defect in ferritin or iron metabolism.

2072 ASSOCIATION OF HLA-A3 AND HLA-B14 ANTIGENS WITH IDIOPATHIC HAEMOCHROMATOSIS.

(Eng.) Simon, M.; Bourel, M.; Fauchet, R.; Genetet, B. (Hopital Pontchaillou, 35043 Rennes Cedex, France). *Gut* 17(5):332-334; 1976.

The frequency of HLA-A3 and HLA-B14 antigens was studied in 51 patients with idiopathic hemochromatosis and it was compared with the frequency in 204 normal blood donors. HLA-A3 and HLA-B14 antigens occurred more frequently in the patients with hemochromatosis than in the controls, 78.4% versus 27.0% and 25.5% versus 3.4%, resp. This finding strongly supports the suggestion that idiopathic hemochromatosis is a genetic disease and suggests that the gene(s) responsible for the disease may be linked to the histocompatibility genes.

2073 CARCINOEMBRYONIC ANTIGEN: EVIDENCE FOR MULTIPLE ANTIGENIC DETERMINANTS AND ISOANTIGENS.

(Eng.) Vrba, R.; Alpert, E.; Isselbacher, K. J. (Harvard Medical Sch., Boston, MA 02114). *Proc. Natl. Acad. Sci. U.S.A.* 72(11):4602-4606; 1975.

Carcinoembryonic antigen (CEA) preparations from various sources were compared by radioimmunoassay. CEA-Roche standard differed significantly from the other three CEA standards tested (CEA-Montreal, CEA-City of Hope, and CEA-British). The serum CEA from a patient with colonic cancer and a serum CEA concentration of over 26,000 ng/ml were antigenicall different from currently available CEA standards as well as from the CEA obtained from the patient's own liver metastases. These antigenic differences were reflected in radioimmunoassay inhibition curves that were different and that were not affected by perchloric acid extraction of CEA. Because of the antigenic variation in the serum CEA, markedly different CEA concentrations (varying by three orders of magnitude) were measurable by two different antisera (Roche and Montreal). All the various CEA standards and samples cochromatographed on columns of Sepharose-6B, despite the large antigenic variation. It is postulated that CEA consists of a family of "isoantigens" with multiple antigenic determinants. Because a different serum CEA isoantigen was isolated, the authors believe that results of radioimmunoassays currently used for CEA measurement may not represent absolute concentrations of serum "CEA," but may reflect the binding affinity of different isoantigens to a particular polyvalent CEA antiserum.

2074 LAPAROSCOPY IN LIVER DISEASE.

(Eng.) Balfour, T. W. (General and City Hosps., Nottingham, U.K.). *Lancet* 1(7960):612-613; 1976.

The use of laparoscopy in the diagnosis of liver disease was evaluated. Results indicate that it was technically successful in 73 of 75 patients in whom liver disease was suspected but not accurately diagnosed after medical investigation. In 46 patients, the final histological diagnosis was either diffuse parenchymatous disease (cirrhosis/hepatitis) or metastatic malignant disease; 2 patients had a curable medical disease (tuberculous ascites), and 6 had a curable surgical disease (5 with gallstones and 1 with an ectopic adrenal tumor). There were no deaths and no serious complications. In conjunction with increasingly accurate noninvasive techniques for localizing lesions in the liver, laparoscopy, with directed biopsy, should help to provide correspondingly accurate histological confirmation.

2075 LYMPHOCYTE TRANSFORMATION TEST WITH LIVER-SPECIFIC PROTEIN AND PHYTOHAEMAGGLUTININ IN PATIENTS WITH LIVER DISEASE. (Eng.) Thestrup-Pedersen, K.; Ladefoged, K.; Andersen, P. (Yale Univ. Sch. Medicine, New Haven, CT 06510). *Clin. Exp. Immunol.* 24(1):1-8; 1976.

Lymphocytes from 34 untreated patients with various liver diseases were stimulated in a lymphocyte transformation test with liver-specific protein (LSP). Eight of 10 patients with chronic active or persistent hepatitis, 2 of 5 patients with nonalcoholic cirrhosis, and 6 of 19 patients with acute hepatitis showed a positive *in vitro* reactivity to LSP. In a control group of 12 persons without liver disease, 11 gave a negative response to LSP stimulation, and 1 person showed a positive response. Among 14 patients with chronic hepatitis or nonalcoholic cirrhosis treated with prednisone at the time of the investigation, only 1 showed reactivity to LSP stimulation. Three patients in this group had a positive reaction before prednisone was given. There was no statistically significant correlation between the reactivity to LSP stimulation and the presence or absence of hepatitis-associated antigen (HBAg) in serum, or with the biochemical liver parameters. The response to *in vitro* stimulation with phytohemagglutinin was found to be significantly lower as compared with the control group, with 11 patients with alcoholic liver disease, and with the patients with acute hepatitis who had HBAg in serum. This decrease in reactivity could not be ascribed to immunosuppressive factors in the patients' sera.

2076 LIVER SCAN IN BUDD-CHIARI SYNDROME. (Eng.) Meindok, H.; Langer, B. (Toronto Western Medical Building, 25 Leonard Ave., Toronto, Ontario M5T 2R2, Canada). *J. Nucl. Med.* 17(5):365-368; 1976.

The value of hepatic scintigraphy in the diagnosis and follow-up of the Budd-Chiari syndrome (occlusion of hepatic veins) was assessed in 17 liver scans of 7 patients with confirmed Budd-Chiari syndrome. In five patients whose three main hepatic veins were occluded, liver scans (with ^{198}Au-colloid or ^{99m}Tc-sulfur colloid) showed hepatomegaly, markedly diminished uptake over the left and right hepatic lobes involving the right more than the left, and a persistent midline region of normal or increased uptake. The latter effect is probably caused by uptake in segments surrounding the inferior vena cava that have direct venous drainage. In the two patients with incomplete occlusion, there was absent or diminished uptake in the scans over the segments with occluded veins. Liver scans were useful in the follow-up of one patient following portocaval shunting. Good correlation existed between selective venography and liver scan findings. It is concluded that liver scan appearance is characteristic enough to warrant consideration of the Budd-Chiari syndrome as the first diagnosis.

2077 A NEW APPROACH TO EVALUATING HEPATIC BLOOD FLOW IN THE PRESENCE OF INTRAHEPATIC PORTAL SYSTEMIC SHUNTING. (Eng.) Gross, G.; Goldberg, H. I.; Shames, D. M. (Univ. California Sch. Medicine, San Francisco, CA 94143). *Invest. Radiol.* 11(2):146-149; 1976.

A new radioisotopic technique for determining the percent of portal venous flow shunted around the hepatic sinusoidal bed was tested in two newborn lambs (which have a temporary, naturally occurring shunt) and in four dogs. The method involved the injection of 20- to 50-µ particles of technetium-99m (^{99m}Tc) microaggregates of albumin (MAA) into the portal vein; these particles are too large to pass through the hepatic sinusoids and would pass through the collaterals found in patients with portal hypertension. Pulmonary isotope activity was measured in the upper portion of the right lung. This area was also monitored following an injection of ^{99m}Tc MAA in a peripheral vein, representing the equivalent activity of a 100% portal systemic shunt. The portal vein was reached via the umbilical vein or the pancreatic vein in the lamb and the dog, resp. In one lamb, the 46% portal systemic flow that was shunted 12 hr after birth decreased to 9% by the third day. In the other lamb, a 3% shunt at 72 hr after birth was associated with a very small ductus venosus. Five days after birth, when the ductus venosus closed, an apparent 1% shunt was present. There was an apparent 1.5-3.9% shunted portal systemic flow in the dogs. This was attributed to the breakdown of ^{99m}Tc, allowing particles to pass through the sinusoids; in one dog, stable ^{95}Nb microspheres, instead of MAA, showed the flow to be reduced to 0.2%. This technique may be useful in determining the type of surgery necessary for bleeding varices, in patients with intrahepatic shunting associated with cirrhosis.

2078 DIAGNOSIS OF HEPATIC HEMANGIOMA USING MULTIPLE-RADIONUCLIDE AND ULTRASOUND TECHNIQUES. (Eng.) Taylor, R. D.; Anderson, P. M.; Winston, M. A.; Blahd, W. H. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *J. Nucl. Med.* 17(5):362-364; 1976.

Two cases of hepatic hemangioma, in which multiple-radionuclide and ultrasound techniques were combined in the diagnostic process, are reported. In both patients, 32- and 47-yr-old men, radiocolloid liver

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scans revealed a large focal defect in the liver, and ultrasound studies demonstrated that the defect was solid. A ^{67}Ga scan in the second patient revealed that images obtained within 6 hr of ^{67}Ga administration could be used to evaluate the blood pool of the lesion. Dynamic perfusion studies with ^{99m}Tc-sulfur colloid in both patients showed no increased perfusion in the region of the lesions, but blood pool scans performed with ^{111}InCl revealed increased uptake in the lesion. Hepatic contrast angiograms gave findings consistent with hepatic hemangioma in both patients. These cases show that noninvasive radionuclide and ultrasound techniques are useful in determining vascularity, blood pool, and, frequently, the pathologic nature of focal hepatic lesions, often obviating the need for invasive contrast angiography. Blood pool imaging proved to be the most definitive diagnostic procedure for the identification of hepatic hemangiomas.

2079 FINE-NEEDLE BIOPSY OF THE LIVER COMPLICATED WITH BILE PERITONITIS. (Eng.) Schulz, T. B. (Aust-Agder Sentralsykehus, Arendal, Norway). *Acta Med. Scand.* 199(1):141-142; 1976.

The case of a previously healthy man who developed bile peritonitis as a complication of fine-needle aspiration biopsy to screen for primary hemochromatosis is presented. During aspiration, bile appeared in the syringe, and laparotomy was necessary 24 hr later. About 1.5 l bile was found in the abdominal cavity; no lesions of the biliary system were seen. Treated with drainage, the further course was uncomplicated. It is suggested that the appearance of bile peritonitis following fine needle biopsy is a rare condition, but that it should be kept in mind when electing this method.

2080 NON-INVASIVE QUANTITATION OF CORNEAL COPPER IN HEPATOLENTICULAR DEGENERATION (WILSON'S DISEASE). (Eng.) Belkin, M.; Chajek, T.; Zeimer, R.; Friedman, G.; Melamed, E. (Hadassah Univ. Hosp., Jerusalem, Israel). *Lancet* 1(7957): 391-392; 1976.

The corneal copper content was measured in seven patients with Wilson's disease and in two normal subjects, by x-ray excitation spectrometry. Patients who were treated irregularly or not treated at all showed a high corneal copper content. Those who were adequately treated (penicillamine, 1-4 yr) had low levels, comparable to the controls. In one case, the corneal copper content declined by 45%, after a course of dimercaprol. The corneal copper measured showed no correlation with the slit-lamp appearance of the Kayser-Fleischer ring. It is suggested that non-invasive x-ray excitation spectrometry can provide a fast and reliable method for the early diagnosis of Wilson's disease and for the objective evaluation of treatment methods.

2081 USE OF CLINDAMYCIN IN PATIENTS WITH LIVER DISEASE. (Eng.) Hinthorn, D. R.; Baker, L. H.; Romig, D. A.; Hassanein, K.; Liu, C. (Univ. Kansas Medical Center, Kansas City, KS 66103). *Antimicrob. Agents Chemother.* 9(3):498-501; 1976.

Clindamycin (300 mg, i.v.) was administered at 12-hr intervals for 2 days to seven patients with acute hepatitis, six patients with chronic hepatitis, nine patients with cirrhosis, and eight controls to determine whether the drug exacerbates pre-existing hepat dysfunction or whether drug excretion is delayed in patients with liver disease, as compared with controls. Exacerbation of hepatotoxicity was not found in this study. There was a small, but significant, delay in drug elimination between cirrhotics and controls, even after the first dose of clindamycin ($p<0.05$); however, half-lives in all categories were normal. It is concluded that clindamycin can be used in patients with acute or chronic hepatitis, or cirrhosis, but that periodic observations of drug activity levels and liver enzyme determinations are necessary.

2082 COMBINATION CHEMOTHERAPY WITH 5-FLUOROURACIL (NSC-19893), METHOTREXATE (NSC-740), PREDNISOLONE (NSC-9900) (FAP PROTOCOL) FOR HEPATOMA. (Eng.) Umsawasdi, T.; Chainuvati, T.; Hitannant, S.; Nilprabhassorn, P.; Viranuvatti, V. (Siriraj Hosp., Bangkok 7, Thailand). *Cancer Chemother. Rep.* 59(6):1167-1169; 1975.

A new protocol consisting of 5-fluorouracil (300 mg/m^2/day, days 1, 8, 15, 22, 29, and 36 of treatment), methotrexate (7 mg/m^2/day, days 1-5, 22-26), and prednisolone (25 mg qid, days 1-5, 22-26) was used in the treatment of 11 patients with hepatocellular carcinoma. One patient responded with complete disappearance of all tumor masses for 207 days. A 50% or greater reduction of all lesions, without evidence of new lesions, and a 30-49% reduction were seen in one and four patients, resp. Complications included nausea, vomiting, stomatitis, alopecia, intermittent diarrhea, thrombocytopenia, hemoperitoneum, and granulocytopenia. The results suggest that this regimen is more effective in patients with normal or nearly normal liver function tests and in those without pulmonary metastases.

2083 EFFECTS OF HYPERTHERMIA THERAPY ON THE LIVER. II. MORPHOLOGICAL OBSERVATIONS. (Eng.) Wills, E. J.; Findlay, J. M.; McManus, J. P. A. (Clinical Res. Center, Harrow, England). *J. Clin Pathol.* 29(1):1-10; 1976.

Light and electron microscopy were used to study liver biopsy specimens obtained from three patients during exogenous hyperthermia treatment of advanced malignant disease. In two patients, the parenchymal cells showed either slight swelling or nuclear alterations by light microscopy; large numbers of autophagic vacuoles, dilatation of Golgi elements and endoplasmic reticulum, and large cytoplasmic vacuoles were observed at the fine structural level. Similar changes, but in much more severe form, together with parenchymal cell necrosis and cholestasis, were seen in the liver of the third patient, who developed jaundice 24 hr after hyperthermia. The degree of liver cell damage in this case was thought to be related to the duration of hyperthermia and to the maximum temperature attained in this patient. However, the findings in the other two cases indicate that transient liver damage probably occurs in all patients who are subjected to hyperthermia.

2084 LIVER-CELL ADENOMAS ASSOCIATED WITH USE OF ORAL CONTRACEPTIVES. (Eng.) Edmondson, H. A.; Henderson, B.; Benton, B. (Univ. Southern California Sch. Medicine, 2025 Zonal Ave., Los Angeles, CA 90033). *N. Engl. J. Med.* 294(9):470-472; 1976.

Possible etiologic factors, including the use of oral contraceptives, were studied in 36 women with liver-cell adenomas. These cases were compared with 34 age-matched controls. Twenty-nine patients and 24 controls had used oral contraceptives. There was a significant difference between cases and controls in mean number of months of contraceptive use--73.4 as compared to 36.2 ($p<0.001$). The women with adenomas took mestranol-containing pills, as opposed to compounds containing ethinyl estradiol, in more cases than did the controls ($p<0.0001$). In 10 cases, the adenoma bled into its substance and ruptured into the abdominal cavity. Eight of these women had a history of use of oral contraceptives, and a history was not available in the other two. The tumors were encapsulated lesions 6-30 cm in diameter, and both infarction and hemorrhage were present in 29 adenomas. The authors conclude that long-term use of oral contraceptives, especially those containing a high total dose of steroids or mestranol, should be balanced against risks of side effects. If a choice is available, contraceptives containing a low dose of estrogen and progesterone and preferably, ethinyl estradiol as the synthetic estrogen should be selected.

2085 PRECURSOR LESIONS FOR LIVER CANCER IN HUMANS. (Eng.) Anthony, P. P. (Middlesex Hosp. Medical Sch., London W.1, England). *Cancer Res.* 36(7):2579-2583; 1976.

The known risk factors leading to liver cell carcinoma in humans are reviewed. Cirrhosis is the most important precursor lesion; both the causative agent and the time of duration of the cirrhotic process are relevant to the magnitude of this risk. According to present knowledge, α_1-antitrypsin deficiency, alcoholism, naturally occurring carcinogens, drugs, and the hepatitis B virus seem to carry the greatest risk of cancer developing in a cirrhotic patient. Cirrhosis, however, is not an essential prerequisite, and some or possibly all of these agents can also induce cancer without cirrhosis. Bile duct carcinoma commonly follows infestation with liver flukes. Cirrhosis is usually absent but duct epithelial hyperplasia is present prior to the development of cancer. Many cellular changes have been observed in patients and among populations considered to be at risk from liver cancer. Of these, liver cell dysplasia is the most striking and studies of its prevalence, natural history, and association with cirrhosis suggest that it is a precancerous change.

2086 CHANGES IN LACTIC DEHYDROGENASE ISOENZYMES AFTER HEPATIC ARTERY LIGATION IN PATIENTS WITH HEPATIC CARCINOMA. (Eng.) Nagasue, N. (Kyushu Univ. Sch. Medicine, 3-1-1 Maidashi, Higashi-ku, Fukuoka, 812 Japan). *Gastroenterol. Jpn.* 10(2):150-156; 1975.

Serum activities of LDH isoenzymes as well as total LDH, SGOT, and SGPT were determined after hepatic artery ligation in five patients with primary or metastatic liver cancer. Transaminases and total LDH activities were raised after the operation, showing peaks on the first or third postoperative days. LDH$_2$, LDH$_3$, and LDH$_5$ increased substantially during the first three postoperative days. These changes became nearly normalized within 2 weeks after hepatic artery ligation. As control, the same enzymatic activities were measured in eight patients after laparotomies, but no significant abnormalities were observed postoperatively. Thus, liberation of cathodic and also anodic migrating LDH isoenzymes seems to occur after acute liver damage induced by hepatic artery ligation. It is also suggested that serial determination of LDH isoenzymes as well as total activity can be valuable for evaluating the antitumor effect of hepatic artery ligation.

2087 FOCAL NODULAR HYPERPLASIA OF THE LIVER: FIVE CASES. (Eng.) Sorensen, T. I. A.; Almersjo, O. (Gentofte Hosp., DK-2900 Hellerup, Denmark). *Scand. J. Gastroenterol.* 11(1):97-101; 1976.

Five cases of benign focal nodular hyperplasia are presented. The patients ranged in age from 25 to 54 yr. One patient exhibited no symptoms other than a liver mass, while the other patients demonstrated pain, anorexia, and minor weight loss. Extrahepatic compression of the portal vein due to the location of the tumor in the omental sac was seen in one patient, and other complications were rare. Biopsy with frozen section excluded malignancy, and yielded the diagnosis from the cirrhosis-like appearance of the tumor. The tumor was excised in four cases and left in place in one, and no evidence of recurrence or metastases was found for 7-59 months. It is concluded that patients with complications or significant symptoms should be treated by removal of the tumor by local resection, or if necessary, by larger hepatic resection. In asymptomatic patients or in those with vague complaints, the tumor may be left in place with minimal risk.

2088 SURGICAL TREATMENT OF HEPATIC METASTASES FROM COLORECTAL CANCERS. (Eng.) Wilson, S. M.; Adson, M. A. (Mayo Graduate Sch. Medicine, Univ. Minnesota, Rochester, MN). *Arch. Surg.* 111(4): 330-334; 1976.

Sixty patients who had resection of hepatic metastases for colorectal cancer were followed up for 2-23 yr. Multiple lesions were removed from 20 patients and solitary lesions were excised from the other 40 patients. Only one patient died during hospital convalescence. No patient who had excised multiple lesions lived for 5 yr. In contrast, 15 of the 36 patients who had resection of apparent solitary lesions lived for 5 yr or more, and 8 patients were alive without evidence of recurrence 10 yr or more after operation. These favorable results of surgical treatment were analyzed in relation to results in 60 patients whose biopsy specimens showed lesions of comparable size and number, which were not removed at the time of colonic resection. No patient in this control group lived for 5 yr. Aggressive surgical treatment of apparent solitary hepatic metastatic lesions from colorectal cancer seems to be justified by the survival rate of surgically treated patients.

2089 PROGRESSIVE INTRAHEPATIC CHOLESTASIS (BYLER'S DISEASE): CASE REPORT. (Eng.) De Vos, R.; De Wolf-Peeters, C.; Desmet, V.; Eggermont, E.; Van Acker, K. (Akademisch Ziekenhuis Sint Rafael, Minderbroedersstraat 12, B 3000 Leuven, Belgium). *Gut* 16(12):943-950; 1975.

The clinical and microscopic findings in a 7-month-old girl with intrahepatic cholestasis (Byler's disease) are presented. The patient presented with pruritus, loose stools, and severe rickets. Hepatic excretion of bile acids, sulfobromophtalein, I^{131} Rose Bengal, and adipiodon-methyl-glucaminate were impaired. There was a pronounced block of bile salt excretion into the intestinal lumen. Electron microscopy disclosed interruptions of the bile canalicular membrane, consistent with this disease. There was also a remarkable increase of microfilamentous structures in the pericanalicular ectoplasm and in the hepatocytic cytoplasm. These findings suggest that the cause of cholestasis is a disturbance in bile acid secretion, entailing a hypertrophy of pericanalicular microfilaments, which are thought to play a role in the final step of biliary secretion.

2090 JAUNDICE AND BRIDGING CENTRILOBULAR NECROSIS OF LIVER IN CIRCULATORY FAILURE. (Eng.) Buhac, I.; Agrawal, A. B.; Park, S. K.; Lomotan, A.; Lowen, B.; Balint, J. A. (Veterans Admin. Hosp., Albany, NY). *N.Y. State J. Med.* 76 (5):678-682; 1976.

The incidence of centrilobular liver necrosis, and its clinical relevance, were studied in postmortem material from 2,264 autopsies (1966-1972) and from a further 4,227 autopsies (1952-1965). In the group of 2,264, centrilobular liver necrosis was found in 15.5% of the cases. Extensive centrilobular necrosis with bridging by necrotic tissue between the adjacent lobules was seen in 3.7% of these cases, and in 0.6% of the cases, bridging centrilobular necrosis was associated with evident jaundice. In the additional 4,227 autopsied patients, jaundice and centrilobular necrosis were found in 0.8% of the cases. Thus, among 6,491 autopsies, bridging centrilobular necrosis was identified as the cause of clinical hyperbilirubinemia (3-28.5 mg/100 ml in 48 cases, or 0.7%). Congestive heart failure secondary to arteriosclerotic heart disease was the most common cause of centrilobular necrosis associated with jaundice. Differentiation of the centrilobular necrosis of the liver associated with jaundice from other types of hepatogenous jaundice is very difficult, and the only way to obtain a secure diagnosis seems to be by liver biopsy.

2091 FAMILIAL OCCURRENCE OF GIANT CELL HEPATITIS IN INFANCY. (Eng.) Sandor, T.; Surinya, M.; Monus, Z. (Univ. Medicine, Pf. 401, 6701 Szeged, Hungary). *Acta Hepatogastroenterol. (Stuttg.)* 23(2):101-104; 1976.

The case of an infant girl with giant cell hepatitis (GCH) is presented. The child's brother died from primary hepatic cancer complicating giant cell hepatitis. The patient protracted neonatal jaundice, which recurred at age 3 months, and abnormal liver function tests. Histologic examination revealed the lobular structure of the liver to be broken down, extensive giant cell transformation, and connective tissue septa extending irregularly from portal tracts into surrounding parenchyma. One year later, the typical giant cells were no longer found, and a morphologically pronounced cholestasis was demonstrated. At surgery for cholelithiasis, definite histologic evidence of cirrhosis with cholestasis was found. The child died at the age of 3.5 yr in a hepatic coma. Although there is no clinical or histological difference between familial and sporadic GCH, it is suggested that the familial form has a poorer prognosis and that the disease is more malignant and has a more rapid course for the first-born child.

2092 SPONTANEOUS HEPATIC ARTERY THROMBOSIS WITH INFARCTION OF THE LIVER. (Eng.) O'Connor, P. J.; Buhac, I.; Balint, J. A. (Albany Medical Coll., Albany, NY 12208). *Gastroenterology* 70(4): 599-601; 1976.

Extensive infarction of the liver, initially thought to be halothane hepatitis, is described in an 80-yr-old man. The patient described severe right upper quadrant abdominal pain and abnormal liver function tests after leg amputation, under halothane anesthesia. Diagnosis was accomplished by percutaneous needle biopsy of the liver, which demonstrated a large area of vascular necrosis. Despite the ischemic injury, the liver function improved while the patient was adequately oxygenated and maintained in fluid and electrolyte balance. The patient died 9 days after surgery, from an acute myocardial infarction. Autopsy showed thrombosis of the celiac trunk with extension into the splenic, common hepatic, and right and left hepatic arteries. Approximately 50% of the hepatic parenchyma was replaced by infarcted tissue. It is suggested that the liver infarction was caused by the patient's inability to maintain an adequate oxygen content of portal venous blood, at the time of thrombosis of the hepatic artery, due to underlying heart disease and obstructive pulmonary disease.

2093 LIVER DYSFUNCTION AND POLYMYALGIA RHEUMATICA. A CASE REPORT. (Eng.) Kosolcharoen, P.; Magnin, G. E. (Univ. Wisconsin Medical Sch., Madison, WI 54449). *J. Rheumatol.* 3(1):50-53; 1976.

The case of a 65-yr-old woman with the polymyalgia rheumatica syndrome and liver dysfunction is described. The patient presented with muscle pain and weakness. Biopsy disclosed several small capillaries that were heavily infiltrated by mononucleated cells and muscle fibers that showed centralization, increase in sarcolemal nuclei, and lipid vacuolization. Liver biopsy demonstrated granuloma formation and massive infiltration of the portal spaces with lymphocytes; in addition, there was a significantly elevated alkaline phosphatase. The patient improved within 3 days of commencing treatment with prednisone (20 mg/day). This case supports the concept that liver dysfunction can occur in polymyalgia rheumatica without underlying secondary illness.

2094 THE VISIBLY FATTY LIVER. (Eng.) Griscom, N. T.; Capitanio, M. A.; Wagoner, M. L.; Culham, G.; Morris, L. (Harvard Medical Sch., Boston, MA). *Radiology* 117(2):385-389; 1975.

Four cases of fatty infiltration of the liver, identified roentgenographically, are reported in children ranging in age from 2 to 19 months. In each case, the first sign was radiolucency of the liver. Cystic fibrosis was diagnosed in one case. Radiological recognition of fatty infiltration has only occurred in young children, thus far.

2095 PELIOSIS HEPATIS. (Eng.) Pliskin, M. (General Hosp. Monroe County, East Stroudsburg, PA). *Radiology* 114(1):29-30; 1975.

The case of a 27-yr-old woman with peliosis hepatis is presented. The late arterial phase of a superior mesenteric injection for arteriography showed multiple small accumulations of contrast material, which became more prominent in the parenchymal and venous phases. Histologically, the condition is characterized by multiple blood-filled cystic spaces that may be lined by endothelium. Although the clinical manifestations of peliosis hepatis are nonspecific, the angiographic findings were prominent and distinctive in the present case. The author concludes that the angiographic appearance of multiple, small diffuse hemangiomas together with the absence of tumor vessels, vascular displacement or encasement, and venous occlusion should distinquish peliosis hepatis from neoplasms.

2096 METABOLIC MECHANISMS IN REYE SYNDROME. END OF A MYSTERY? (Eng.) Thaler, M. M. (Dept. Pediatrics, Univ. California, San Francisco, CA 94116). *Am. J. Dis. Child.* 130(3):241-246; 1976.

Research concerning the Reye syndrome is reviewed. Clinical observations suggest that: the evolution of this syndrome appears to be a function of injury sustained during the earliest phase of the disease, and the severity of the main illness reflects the extent of the initial insult; ammonia may be responsible for the early neurotoxic effects that determine the eventual outcome; and visceral damage, as distinct from selective metabolic deficiency, may develop concurrently with the central nervous system lesion or thereafter, and may also be due to the effects of ammonia. Examination of the enzymes involved in the conversion of ammonia to urea in liver biopsy specimens of patients with the Reye syndrome suggests that a majority of patients may suffer from an inherited or induced defect in ammonia metabolism located in the mitochondria. It is suggested that the postulated deficiencies in the urea cycle may be overcome with oral administration of ornithine, or of its precursor, arginine. In addition, citrulline may enhance removal of ammonia by an alternate pathway.

2097 SCINTIGRAPHIC APPROACH TO THE DIAGNOSIS OF LIVER TUMOR. (Fre.) Chatal, J.-F.; Vasseur, F.; Guihard, D.; Guihard, R. (Service de Medecine Nucleaire, Centre Rene Gauducheau, Nantes, France). *Ouest Med.* 28(16):1103-1109; 1975.

2098 PRIMARY INTRAHEPATIC STONES DIAGNOSED BY ERCP [Abstract]. (Eng.) Johnson, L. F.; Walta, D. C. (Tripler Army Medical Center, Honolulu, Hawaii). *Gastrointest. Endosc.* 21(4):189; 1975.

2099 RADIOLOGICAL SURVEILLANCE IN AMOEBIC LIVER ABSCESS. (Eng.) Ramachandran, S.; Goonatillake, H. D.; Perera, M. V. F. (Colombo North General Hosp., Ragama, Sri Lanka). *J. Trop. Med. Hyg.* 78(6):133-134; 1975.

2100 PROPERTIES OF THE RED-VIOLET COMPLEX OF COPPER AND PENICULLAMINE AND FURTHER INSIGHT INTO ITS FORMATION REACTION. (Eng.) Wright,

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J. R.; Frieden, E. (Dept. Physical Sciences, Southeastern Oklahoma State Univ., Durant, OK). *Bioinorg. Chem.* 4(2):163-175; 1975.

2101 DECREASE IN GLUCOSE TOLERANCE AND INSULIN SECRETION AFTER INTRAVENOUS ADMINISTRATION OF AMMONIUM SALTS IN NORMAL SUBJECTS AND PATIENTS WITH LIVER DISEASES [Abstract]. (Eng.) Schlienger, J. L.; Imler, M.; Stahl, J. (Centre Hospitalier Universitaire, F-67005 Strasbourg Cedex, France). *Digestion* 10(3):243; 1974.

2102 ACCESSORY HEPATIC ARTERIES AND THEIR SIGNIFICANCE IN TREATMENT OF PARENCHYMAL JAUNDICE BY MEANS OF PERIARTERIAL DENERVATION. (Pol.) Dolinski, J.; Noczynski, L. (Instytut Chirurgii AM, 50-326 Wroclaw, ul. Poniatowskiego 2, Poland). *Pol. Przegl. Chir.* 48(3):379-382; 1976.

2103 EXPERIMENTAL THERMOCOAGULATION IN HEPATIC SURGERY. (Rus.) Milonov, O. B.; Gigauri, V. S.; Kniazeva, G. D.; Mlynehik, V. E.; Movchun, A. A.; Andrianov, N. G.; Sheremet'eva, G. F.; Got'e, S. V. (All-Union Scientific Res. Inst. Clinical Experimental Surgery, USSR). *Eksp. Khir. Anesteziol.* (2):28-34; 1975.

2104 THE EFFECT OF PORTACAVAL SHUNT ON COLON TRANSFER OF AMMONIA IN CIRRHOSIS OF THE LIVER [Abstract]. (Eng.) Sein, M. M.; Hardy-Smith, A.; Shields, R. (Dept. Surgery, Univ. Liverpool, Liverpool, England). *Mayo Clin. Proc.* 50(9):536; 1975.

2105 CARDIOVASCULAR EFFECTS OF SEVERE LIVER DISEASE. (Eng.) Wechsler, R. L. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA). *Am. J. Dig. Dis.* 21(2):114-129; 1976.

2106 PSYCHOSOMATIC ALTERATIONS IN LIVER DISEASES. (Ger.) Kellner, K. (II. Med. Klinik, Klinikum rechts der Isar, Techn. Univ., Ismaninger Strasse 22, 8 Munich 80, Germany). *Fortschr. Med.* 94(9):501-504; 1976.

2107 LIVER AND INTESTINE FUNCTION INVESTIGATION IN PATIENTS WITH IMMEDIATE-TYPE ALLERGIC REACTIONS. (Pol.) Karna, T.; Gruszecka, M. (Z Kliniki Alergologicznej Instytutu Chorob Wewnetrznych AM w Bialymstoku, Poland). *Pol. Tyg. Lek.* 30(5): 189-191; 1975.

2108 THE BUDD-CHIARI SYNDROME. (Fre.) Demol, P.; De Groote, J.; Baert, A. (Academisch Ziekenhuis Sint-Rafael, Capucijnenvoer 35, B-3000 Leuven, Belgium). *Acta Gastroenterol. Belg.* 39(1/2): 42-55; 1976.

2109 DIAGNOSIS OF PRIMARY LIVER CANCER. (Fre.) Debray, Ch.; Paolaggi, J.-A.; Mugnier, B.; Barret, C. (Hopital Bichat, 170 bd Ney, 75877 Paris Cedex 18, France). *Entretiens Bichat Med.* 1974:325-334.

2110 AN ABNORMALITY OF SERUM FERRITIN IN PRIMAR LIVER CELL CANCER [Abstract]. (Eng.) McKeering, L. V.; Halliday, J. W.; Powell, L. W. (Royal Brisbane Hosp., Brisbane, Queensland, Australia). *Aust. N.Z. J. Med.* 5(4):398; 1975.

2111 PRIMARY LIVER CANCER: BIOLOGICAL SYMPTOMATOLOGY. (Fre.) Aron, E. (Chaire de Clinique Medicale, Faculte de Medecine de Tours, Tours, France). *Ouest Med.* 28(16):1089-1091; 1975.

2112 CAVERNOUS ANGIOMA OF THE LIVER: CASE REPORT AND LITERATURE REVIEW. (Ita.) d'Errico, F.; Sgro, M. (Ospedale Provinciale di Bust Arsizio, Busto Arsizio, Italy). *Ann. Ital. Chir.* 47(6):567-576; 1975.

2113 FUNCTIONAL STATE OF THE LIVER IN PATIENTS WITH MALIGNANT NEOPLASMS, OPERATED UPON UNDER CONDITIONS OF GANGLIONARY BLOCKADE WITH MODERATE HYPOTENSION. (Rus.) Dedenko, I. K.; Koval'chuk, I. A.; Shkurovskii, V. T. (Kadiyevka Clinic Oncology, Kadiyevka, Voroshilovgrad Oblast, USSR). *Vestn. Khir.* 115(7):84-86; 1975.

2114 INCREASED UDP KINASE ACTIVITY IN RAT AND HUMAN HEPATOMAS. (Eng.) Williams, J. C.; Weber, G.; Morris, H. P. (Indiana Univ. Sch. Med., Indianapolis, IN). *Nature* 253(5492):567-569; 1975.

2115 MODERN VIEWS ON CHOLESTASIS. (Eng.) Palynyczko, Z.; Milewski, B. (Lab. Railway Health Service Hosp., Warsaw, Poland). *Mater. Med. Pol.* 7(2):149-157; 1975.

2116 THE STUDY OF GLYCOGEN METABOLISM IN LIVER TISSUE IN GLYCOGENOSIS OF THE TYPE III (LIMIT DEXTRINOSIS). (Rus.) Chibisov, I. V.; Leont'ev, A. F.; Rozenfel'd, E. L. (Inst. Biological Medical Chemistry, USSR Acad. Medical Sciences, Moscow, USSR). *Vopr. Med. Khim.* 21(2):162-165; 1975.

2117 THE CLINICAL SIGNIFICANCE OF GRANULOMATOUS HEPATITIS IN AUSTRALIA [Abstract]. (Eng.) Rowland, R.; Fitch, R. J.; Jennings, W. (Royal Adelaide Hosp., Adelaide, South Australia). *Aust. N.Z. J. Med.* 5(4):398; 1975.

2118 MECHANISM OF HYPONATRAEMIA IN FULMINANT HEPATIC FAILURE [Abstract]. (Eng.) Alam, A. N.; Wilkinson, S. P.; Moodie, H. E.; Williams,

R. (King's Coll. Hosp., London, England). *Clin. Sci. Mol. Med.* 49(3):28p; 1975.

2119 CYTOXICITY OF PLASMA FROM PATIENTS WITH ACUTE HEPATIC FAILURE TO ISOLATED LIVER CELLS [Abstract]. (Eng.) Hughes, R. D.; Cochrane, A. M. G.; Thomson, A. D.; Murray-Lyon, I. M.; Williams, R. (King's Coll. Hosp., Denmark Hill, London S.E. 5, England). *Clin. Sci. Mol. Med.* 49(3):5p; 1975.

2120 BILIARY PERITONITIS WITHOUT PERFORATION. (Fre.) Teiniere, P. (Clinique Chirurgicale, Hopital Charles-Nicolle, 76000 Rouen, France). *Med. Chir. Dig.* 4(4):243-246; 1975.

2121 COPPER METABOLISM DISTURBANCES AS A TRIAL OF EXPLAINING ANALOGOUS PATHOLOGICAL MECHANISMS IN WILSON SYNDROME AND IN SEVERE CASES OF LIVER CIRRHOSIS. (Pol.) Pawlak, J. (Szpital J. Brudzinskiego, ul. Zubardzka 16 m, 13, 91-022 Lodz, Poland). *Wiad. Lek.* 28(12):1041-1044; 1975.

See also, 1654, 1672, 1703, 1746, 1748, 1769, 1771, 1772, 1774, 1786, 1809, 1811, 1934, 1941, 1964, 2033, 2044, 2046, 2058, 2127, 2150, 2154, 2155, 2173, 2178, 2189, 2190, 2195, 2197, 2205, 2209, 2212, 2224, 2225, 2246, 2265, 2288, 2289.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

2122 SIGNIFICANCE OF HYPERBILIRUBINEMIA IN ACUTE CHOLECYSTITIS. (Eng.) Dumont, A. E. (New York Univ. Sch. Medicine, New York, NY). *Surg. Gynecol. Obstet.* 142(6):855-857; 1976.

The incidence and significance of hyperbilirubinemia were examined in 110 patients who had symptoms of acute cholecystitis and underwent laparotomy. Thirty-two patients had abnormally elevated serum bilirubin levels on admission. Surgical or roentgenographic examination of the common duct, or both, in 19 of these patients disclosed stones in 13. Serum levels of bilirubin averaged 6.1 mg% in those with stones and 2.7 mg% in the others. In the remaining 13 patients, the common duct was not examined, but elevated bilirubin levels, averaging 2.6 mg%, quickly returned to normal values. Hyperbilirubinemia significantly increases the likelihood of finding common duct stones in patients with acute cholecystitis, although it also occurs frequently in patients with acute cholecystitis without common duct stones. The latter situation may depend on an alteration in the normal impermeability of epithelium of the gallbladder to conjugated bilirubin.

2123 EFFECT OF DIETARY COMPOSITION ON THE UNCONJUGATED HYPERBILIRUBINAEMIA OF GILBERT'S SYNDROME. (Eng.) Gollan, J. L.; Bateman, C.; Billing, B. H. (Royal Free Hosp., Pond St., Hampstead, London NW3 2QG, England). *Gut* 17(5):335-340; 1976.

The influence of dietary composition on the unconjugated hyperbilirubinemia of Gilbert's syndrome was studied in 29 patients. After a period on a normal diet (10 MJ), an i.v. infusion of 40% glucose (8.4 MJ) together with a 1.6 MJ p.o. diet for 2 days resulted in an increment in plasma bilirubin concentration of 127 ± 18% above the basal level. Both the administration of i.v. Intralipid (20%) and the return to a normal diet caused a prompt reversal of this glucose effect. An increment of 135 ± 10% in plasma bilirubin concentration was obtained when a standard "fasting" diet (1.6 MJ) was given for 2 days. When the lipid content of this fasting diet was increased from 33% to 85%, the rise in plasma bilirubin was only 49 ± 19%. A 10 MJ p.o. diet for 3 days, which contained most of its energy content as carbohydrate and only 0.6% as lipid, produced a 76 ± 12% increase in plasma bilirubin concentration. When the lipid content of the diet was increased to 9% of the energy intake, no significant change from the basal level was observed. These findings support the hypothesis that the hyperbilirubinemia associated with both carbohydrate feeding and fasting is attributable, at least in part, to lipid withdrawal. Although a restricted dietary intake or the parenteral administration of lipid-free solutions has a marked effect on the hyperbilirubinemia of patients with Gilbert's syndrome, normal daily variation in dietary composition is unlikely to cause a significant change. The influence of different feeding regimes on neonatal hyperbilirubinemia requires investigation.

2124 POSTOPERATIVE JAUNDICE: MECHANISM, DIAGNOSIS AND TREATMENT. (Eng.) Van Thiel, D. H.; Lester, R. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Surg. Clin. North Am.* 55(2): 409-418; 1975.

2125 DRUG METABOLISM IN GILBERT SYNDROME. PART 2: STUDY OF THE URINARY ELIMINATION OF THE TOLBUTAMIDE METABOLITES IN SUBJECTS

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WITH GILBERT SYNDROME. (Ita.) Ponz De Leon, M.; Carulli, N. (Istituto di Clinica Medica Fenerale, Universita di Modena, Modena, Italy). *Fegato* 20(1):13-16; 1974.

2126 DRUG METABOLISM IN GILBERT SYNDROME. PART 4: EFFECT OF PHENOBARTITAL TREATMENT ON THE PLASMA HALF-LIFE OF TOLBUTAMIDE. (Ita.) Ponz De Leon, M.; Carulli, N. (Istituto di Clinica Medica Generale, Universita di Modena, Modena, Italy). *Fegato* 20(1):25-28; 1974.

2127 DIFFERENTIATION OF NEONATAL HEPATITIS AND CONGENITAL BILIARY ATRESIA. (Eng.) Anonymous. (Dept. Pediatrics, Hsin Hua Hosp., Shanghai, China). *Chin. Med. J.* (2):26; 1974.

2128 NONCHOLESTATIC BILIRUBIN EXCRETORY DEFECT. (Spa.) Orellana A., J. M. (Hospital Jose J. Aguirre, Santiago, Chile). *Rev. Med. Chile* 103(2):135-137; 1975.

See also, 1674, 2243.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

2129 EPIDEMIOLOGICAL STUDIES OF PVC MANUFACTURERS AND FABRICATORS, AND PRIMARY ANGIOSARCOMA OF THE LIVER. (Eng.) Baxter, P. J. (Baynards House, 1 Chepstow Place, London W2 4TF, England). *Proc. R. Soc. Med.* 69(4):297-299; 1976.

A prospective study of polyvinyl chloride (PVC) manufacturers, a prospective study of PVC fabricators, and a retrospective study of primary angiosarcoma of the liver, to determine any relation between the risk of occupational exposure to vinyl chloride and the development of primary liver angiosarcoma are described. Prospective mortality and cancer registration studies to test hypotheses concerning the carcinogenicity of vinyl chloride in other sites, such as the lung and brain, are also discussed. In the absence of a satisfactory objective test for use in morbidity surveys, mortality data should enable the assessment of more serious complications of periportal fibrosis due to vinyl chloride.

2130 MEDICAL SURVEILLANCE OF VINYL CHLORIDE WORKERS. (Eng.) Duck, B. W. (BP Res. Center, Sunbury on Thames, TW16 7LN, U.K.). *Proc. R. Soc. Med.* 69(4):307-309; 1976.

A clinical survey was undertaken in 1,357 vinyl chloride (VC) workers and 429 workers without VC exposure from six polymerization plants, following reported cases of angiosarcoma of the liver among workers exposed to VC. The initial examination comprised medical history, physical examination, biochemical tests (SGOT, SGPT, GGTP, alkaline phosphatase, and bilirubin), platelet count, and urinalysis. Initial liver function test abnormalities were found in 12.5% of the VC workers and in 16.5% of the controls. Repeat tests on VC workers with abnormal findings revealed persistent abnormalities in about one-third of these individuals (56 men). Thus far no obvious liver disease due to vinyl chloride exposure was identified, but the procedure enabled individuals with persistent liver dysfunction to be detected and removed from VC exposure. It is recommended that to be effective, liver function tests should: yield positive findings at an early stage of disease; produce few false positive and negative results; be able to differentiate between pathological conditions due to VC and to other causes, such as alcohol.

2131 EPIDEMIOLOGICAL STUDIES OF VINYL CHLORIDE HEALTH EFFECTS IN THE UNITED STATES. (Eng.) Falk, H.; Waxweiler, R. J. (Dept. Health, Education, Welfare, Atlanta, GA 30333). *Proc. R. Soc. Med.* 69(4):303-306; 1976.

Three epidemiological studies of the effects of vinyl chloride (VC) in the United States are reviewed. Age and sex differences in hepatic angiosarcoma were consistent with the hypothesis that occupational exposure is a more significant cause of hepatic angiosarcoma than of non-angio hepatic sarcoma. A cross-sectional medical screening examination of 130 workers at a polyvinyl chloride (PVC) polymerization plant showed no significant differences between the workers and controls in any of six liver function tests (SGOT, bilirubin, alkaline phosphatase, LDH, GGTP, and ornithine carbamyl transferase). In a cohort mortality study at four PVC polymerization plants, 12 cases of lung cancer were discovered. However, lung cancer did ot correlate as highly with VC exposure as did epatic angiosarcoma. It is suggested that some dditional chemical exposure at these plants may be orking together with VC, or separately, to produce his effect.

2132 JAUNDICE DUE TO CARBIMAZOLE. (Eng.) Lunzer, M.; Huang, S. N.; Ginsburg, J.; hmed, M.; Sherlock, S. (1120 HSW, Univ. California, an Francisco, CA 94143). *Gut* 16(11):913-917; 1975.

he case report of a 63-yr-old woman who developed aundice due to carbimazole is presented. On three ccasions, the patient, who had hyperthyroidism, eveloped a reaction that included fever, pruritus, alaise, and, on one occasion, jaundice 1-17 days after taking carbimazole (5 mg tds). Challenge with carbimazole (2 x 5 mg) was followed within 12 hr y abdominal pain, pruritus, and increased serum transaminase levels. Light microscopy of a percutaneous liver biopsy showed increase of portal zone cellularity over the control. Electron microscopy revealed fine structural changes compatible with drug-related liver injury; the liver cells showed a marked degree of proliferation of smooth endoplasmic reticulum, segmental fusiform dilatation of the cisternae of the granular endoplasmic reticulum, numerous small autophagic vacuoles, and "blistering" of the mitochondrial membranes. It is concluded that jaundice is an extremely rare complication of carbimazole therapy.

2133 DANTROLENE HEPATITIS. (Eng.) Schneider, R.; Mitchell, D. (St. Thomas Hosp., 4220 Harding Rd., Nashville, TN 37202). *JAMA* 235(15): 1590-1591; 1976.

The case of a 38-yr-old woman who developed hepatitis following treatment with dantrolene sodium for multiple sclerosis is presented. The patient had received dantrolene for 4 months, at a maximum dose of 400 mg/day. During treatment, she felt weak with mild malaise. She developed severe jaundice, and her total serum bilirubin level reached 32.8 mg/100 ml, 16 days after the treatment was discontinued. Menghini suction liver biopsy revealed swelling, vacuolation, and ballooning of pericentral hepatocytes, and many binucleate forms were observed. The patient was believed to have a cholestatic hepatitis secondary to dantrolene therapy. Serum bilirubin returned to normal after over 3 months. It is recommended that this drug be used with caution in people with liver disease, and that liver function be monitored in all patients who receive dantrolene.

2134 POSSIBLE HEPATOTOXICITY OF DOXIDAN. (Eng.) Tolman, K. G.; Hammar, S.; Sannella, J. J. (Univ. Utah Coll. Medicine, 50 North Medical Drive, Salt Lake City, UT 84132). *Ann. Intern. Med.* 84(3): 290-292; 1976.

The case of a 24-yr-old woman who developed leukopenia and liver disease while taking Doxidan (a laxative containing 1,8-hydroxyanthraquinone and dioctyl calcium sulfosuccinate) is reported. The patient took the drug for 1 yr prior to presentation with anorexia, vomiting, headaches, and a syncopal episode; she had increased the dose from one capsule/day to four capsules/day, 3 weeks before hospitalization. Alkaline phosphatase was 339 IU. A liver biopsy revealed chronic inflammatory cell infiltrate invading adjacent hepatic parenchyma. The infiltrate was associated with focal hepatocellular necrosis, creating a histologic pattern of chronic aggressive hepatitis. There was a granular deposit of IgE that was heaviest within the Kupffer cells. Liver function returned to normal when the drug was discontinued. When the patient was experimentally rechallenged with Doxidan (50 mg 1,8-hydroxyanthraquinone plus 60 mg dioctyl calcium sulfosuccinate, one capsule/day), alkaline phosphatase again increased. Heat fractionation showed that the alkaline phosphatase was 85% hepatobiliary. It is suggested that dioctyl calcium sulfosuccinate may have potentiated the toxicity. The finding of IgE deposition may suggest a causal relation between IgE and the hepatocellular necrosis. The mechanism of toxicity remains unclear.

2135 A NITROFURANTOIN-INDUCED DISORDER STIMULATING CHRONIC ACTIVE HEPATITIS: A CASE REPORT. (Eng.) Fagrell, B.; Strandberg, I.; Wengle, B. (Karolinska Institutet at Serafimerlasarettet, Stockholm, Sweden). *Acta Med. Scand.* 199(3): 237-239; 1976.

A 78-yr-old woman with liver damage resembling chronic active hepatitis occurring during long-term (4 yr) nitrofurantoin treatment (50 mg, 1-3 times/day) is described. On admission to the hospital she displayed jaundice, ascites, and high serum levels of SGOT, SGPT, bilirubin, and γ-globulin as well as high titers of antinuclear factor, and antibodies against smooth muscle cells. After withdrawal of nitrofurantoin, the clinical and laboratory picture normalized without corticosteroid treatment, suggesting that the liver reaction was drug-induced. It is concluded that drug reactions should be considered among the etiological factors of chronic active hepatitis and that nitrofurantoin administration should be avoided in such cases.

2136 LIVER DAMAGE IN SCARLET FEVER: DESCRIPTIONS OF TWO AFFECTED CHILDREN. (Eng.) Kocak, N.; Ozsoylu, S.; Ertugrul, M.; Ozdol, G. (Hacettepe Univ., Faculty Medicine, Ankara, Turkey). *Clin. Pediatr. (Phila.)* 15(5):462-464; 1976.

Two cases of scarlet fever, in which hepatitis became apparent during the acute phase, are described. Two girls aged 9 and 12 yr had palpable livers, jaundice, bilirubinuria, and abnormal liver function tests. A needle biopsy of the liver in the second patient showed polymorphonuclear leukocyte infiltration in the portal area, with degenerative changes in the hepatocytes. Most symptoms disappeared by the 11th or 12th day in both patients. Since the cases of hepatitis occurred during the early phase of scarlet fever without associated conditions, it is suggested that it was a rare complication of liver toxicity.

2137 GRANULOMATOUS HEPATITIS CAUSED BY B.C.G. DURING IMMUNOTHERAPY FOR A MALIGNANT MELANOMA. (Fre.) Serrou, B.; Michel, H.; Dubois, J.-B.; Serre, A. (No affiliation given). *Arch. Fr. Mal. App. Dig.* 64(3):287-288; 1975.

2138 HEPATITIS AND ORAL CONTRACEPTIVES. (Fre.) Gasnault, J. P. (No affiliation given). *Lille Med.* 19(10):1031-1034; 1974.

2139 ACUTE LIVER INJURY AND PARACETAMOL [Abstract]. (Eng.) Smith, C. I.; Gallagher, N. D. (Royal Prince Alfred Hosp., Camperdown, NSW, Australia). *Aust. N.Z. J. Med.* 5(4):394; 1975.

See also, 2195.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

2140 MORPHOLOGY OF THE GB HEPATITIS AGENT. (Eng.) Almeida, J. D.; Deinhardt, F.; Holmes, A. W.; Peterson, D. A.; Wolfe, L.; Zuckerman, A. J. (Wellcome Res. Lab., Langley Park, Beckenham, Kent BR3 3BS, England). *Nature* 261(5561): 608-609; 1976.

The sera of marmosets were inoculated with serum from a patient who developed mild acute hepatitis, and the GB hepatitis agent was isolated and examined electron microscopically. The GB isolate had a peak size distribution between 20-22 nm; this agent was smaller than another hepatitis isolate, MS-1 (hepatitis A). GB was also more fragile, as crescent-shaped forms were a recurrent feature, whereas these forms were not seen in the MS-1 agent. The infectious GB serum also reacted with convalescent serum, revealing a few relatively small aggregates (immune complexes) of particles. It is concluded that the GB agent does not belong morphologically to either hepatitis A or B, and it may well be a third agent causing viral hepatitis in man.

2141 DETECTION OF VIRAL HEPATITIS TYPE A. (Eng.) Hollinger, F. B.; Bradley, D. W.; Dreesman, G. R.; Melnick, J. L. (Baylor Coll. Medicine, Houston, TX 77030). *Am. J. Clin. Pathol.* 65(5):854-865; 1976.

A microtiter solid phase immunoradiometric assay (micro-SPIRA) developed for detecting hepatitis A (HAAg) and anti-HA was evaluated in acute phase human stool specimens or marmoset liver homogenates containing hepatitis A virus particles. The method involved the coupling of unlabeled immunoglobulin containing anti-HA to the insoluble polyvinyl matrix of a microtiter well, enabling extraction of the immunologically reactive HA antigen from the unknown sample. bound antigen was measured, following interaction wit radiolabeled ^{125}I-immunoglobulin G preparation containing anti-HA. Coincident peaks of radioactivity and hepatitis A virus (HAV) particle counts were obtained by micro-SPIRA and immunoelectronmicroscopy, with the major proportion of the antigenic activity o curring at bouyant densities between 1.31-1.35 g/cm^3 in human stools and 1.27 g/cm^3 in liver preparations. Specificity for HAV antigen was confirmed by a blocking test in which the HA antigenic reaction was inhibited by convalescent sera, but not by pre-immune sera obtained from four volunteers who were experimentally infected with HAV. It is concluded that the application of the micro-SPIRA technique to the detection of HAV antigen and its antibody provides a means for diagnosing viral hepatitis type A and for studying the pathogenesis of this disease.

2142 MUSSEL-ASSOCIATED VIRAL HEPATITIS, TYPE A: SEROLOGICAL CONFIRMATION. (Eng.) Dienstag, J. L.; Lucas, C. R.; Gust, I. D.; Wong, D. C.; Purcell, R. H. (Natl. Insts. Health, Building 7, Room 301, Bethesda, MD 20014). *Lancet* 1 (7959):561-563; 1976.

Seven members of a family of 14 developed acute viral hepatitis approximately 1 month after 10 members ate incompletely cooked mussels. There was a statistically significant difference in attack rates between mussel-ingesters (70%) and noningesters (0%, $p=0.035$). The etiological role of hepatitis-A virus, suspected on epidemiological grounds, was serologically confirmed by the demonstration of rises in titers of serum-antibody to hepatitis-A antigen (serologically related to the MS-1 strain of hepatitis-A virus), determined by immune adherence hemagglutination.

2143 HBc AND HBs ANTIGEN IN HEPATOCYTES.

(Eng.) Shikata, T.; Yoshizaki, C.; Okazaki, K.; Uzawa, T.; Matsushita, H.; Toyokawa, S.; Takahashi, T.; Gotoh, A. (Faculty Medicine, Univ. Tokyo, Hongo, Bunkyo-ku, Tokyo 113, Japan). *Gastroenterol. Jpn.* 10(3):199-207; 1975.

The relation between the electron microscopic structures and the immunofluorescent appearance of hepatitis B (HB) antigen found in the hepatocytes of patients with HB antigenemia was studied. The hepatocyte nuclei, containing numerous virus-like particles, showed positive immunofluorescence by antiserum against the core of Dane particles. The areas in which filamentous structures were observed in the cisternae of endoplasmic reticulum and hyaloplasma corresponded to orecein- or aldehyde-fuchsin-positive substances in the light microscope. However, a direct relation between filamentous structures and HB surface antigen is still obscure. It is concluded that virus-like particles in the nucleus correspond to core and filamentous structures in the cytoplasma correlate with coat protein of hepatitis B virus.

2144 THE LOCALISATION OF HEPATITIS B ANTIGEN AND IMMUNOGLOBULIN G IN LIVER TISSUE: AN IMMUNOFLUORESCENCE, LIGHT AND ELECTRON MICROSCOPIC STUDY.

(Eng.) Roos, C. M.; Feltkamp-Vroom, T. M.; Helder, A. W. (Central Lab. Netherlands Red Cross Blood Transfusion Service, P.O.B. 9190, Amsterdam, the Netherlands). *J. Pathol.* 118(1):1-8; 1976.

Liver tissue specimens from 43 hepatitis B antigen (HBAg) seropositive patients and 22 HBAg seronegative individuals were investigated for the presence of HBAg, using the immunofluorescence technique. Histological diagnoses were established with light microscopy on routinely stained frozen liver sections. The liver specimens of 42 of the 43 HBAg-positive patients showed positive fluorescence. Three distinct fluorescence patterns were observed: diffuse, focal, and solitary. The diffuse pattern appeared to occur particularly in chronic aggressive or persistent hepatitis. The focal pattern was seen only in the group of patients without obvious alterations, and the solitary pattern was seen especially in acute hepatic necrosis. Fifteen out of the 42 HBAg-positive liver specimens were investigated with the electron microscope. Eight of 15 HBAg-positive liver specimens had approximately 23 nm nuclear particles. In these eight cases, nuclear IgG was observed with the immunofluorescence technique. It was also observed in 14 other specimens, which were studied with the electron microscope. It is suggested that immune complexes consisting of virus-core antigen and IgG are present in the nuclei of hepatocytes.

2145 HEPATITIS B SURFACE ANTIGEN AND ANTIBODY IN ASYMPTOMATIC BLOOD DONORS.

(Eng.) Sinclair, J. C.; Feinman, S. V.; Wrobel, D. M.; Berris, B. (Dept. Medicine, Univ. Toronto, Suite 427, 600 Univ. Ave., Toronto, M5G 1X5, Ontario, Canada). *JAMA* 235(10):1014-1017; 1976.

Seventy-two volunteer blood donors who had hepatitis B surface antibody (anti-HBs) were studied and compared with 115 carriers of hepatitis B surface antigen (HBsAg). Anti-HBs-positive donors gave a history of greater possible exposure to hepatitis B virus (32 of 72 in comparison with 17 of 115, $p<0.01$). There was a lower male-female ratio in the anti-HBs-positive donors (1.7:1 compared to 3.6:1), and they had a much lower frequency of abnormal hepatic function test results; 46% of carriers had abnormal results, while only 18% of the antibody-positive group had minimal abnormalities. Those who were positive by counterimmunoelectrophoresis (CIEP), which indicated a high titer of antibody (>1:2,000, as measured by passive hemagglutination assay), also had an ethnic origin similar to that of the donor panel, i.e., predominantly Canadian and northern European. A majority of the HBsAg carriers, on the other hand, had origins in the Mediterranean and Far Eastern countries. Low antibody-titer (positive passive hemagglutination assay but negative CIEP) donors had ethnic origins that more closely approximated those of HBsAg carriers. These ethnic differences may be due to genetic factors, to a difference in degree of antigen-antibody complexing, or to exposure to hepatitis B in the low titer group during the early years of life.

2146 LACK OF AN AUTOSOMAL RECESSIVE GENETIC INFLUENCE IN VERTICAL TRANSMISSION OF HEPATITIS B ANTIGEN.

(Eng.) Stevens, C. E.; Beasley, R. P. (New York Blood Center, 310 East 67th St., New York, NY 10021). *Nature* 260(5553):715-716; 1976.

The rates of hepatitis B antigenemia among children in two groups of families--those in which both parents were hepatitis B antigen (HBsAg) carriers and those in which the mother was a carrier, but the father's serum was antibody (anti-HBs)-positive--were compared to determine whether the predisposition to the HBsAg carrier state is inherited as an autosomal recessive gene. HBsAg was detected by radioimmunoassay, and anti-HBs was detected by passive hemagglutination. Babies in both groups were followed from birth for the same period of time (mean, 12 months), and none of the babies or their siblings had clinical hepatitis. Twenty-two out of 27 babies retested after the first positive specimens (8 of 9 with an antigen-carrier father and 14 out of 18 with an antibody-positive father) remained HBsAg carriers. An additional baby in each group

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developed anti-HBs (neither had had previously detected antigenemia). Thus, the frequency of antigenemia among the offspring was unrelated to whether the father's serum was antigen or antibody positive. The data seem to be incompatible with an autosomal recessive mode of inheritance for HBsAg carrier predisposition, as all offspring of families in which both parents were antigen carriers would have had to be homozygous for carrier predisposition. It is suggested that the infectious dose and the age when infection occurs are more important determinants of the carrier state.

2147 CHRONIC CARRIERS OF HEPATITIS B ANTIGEN (HBsAg): HISTOLOGICAL, BIOCHEMICAL, AND IMMUNOLOGICAL FINDINGS IN 31 VOLUNTARY BLOOD DONORS.

(Eng.) Villeneuve, J. P.; Richer, G.; Cote, J.; Guevin, R.; Marleau, D.; Joly, J. G.; Viallet, A. (Hopital Saint-Luc, 1058, St-Denis St., Montreal, P. Quebec, Canada). *Am. J. Dig. Dis.* 21(1):18-25; 1976.

Thirty-one hepatitis B surface antigen (HBsAg) carriers submitted to liver biopsy. They were followed for a period of 10-33 months, and all remained positive for HBsAg. Fifteen of these 31 subjects had lived in institutions during infancy or childhood, and none were drug users. Histological examinations revealed 24 cases of chronic persistent hepatitis (CPH), 2 cases of chronic aggressive hepatitis, 2 patients with steatosis, and 3 patients with normal liver. On repeated determination, 16 of the 31 subjects had at least 1 elevated transaminase level. Transaminase levels were not correlated with the histological diagnosis. Four cases had positive antinuclear antibodies, all in the CPH group, a finding that was not correlated with any clinical, biological, or histological findings. The search for other auto-antibodies and the immunoglobulin determinations were inconclusive. It appears that chronic HBsAg carriers often have chronic hepatitis, usually persistent, occasionally aggressive; liver biopsy still remains the most useful approach in the evaluation of these HBsAg carriers.

2148 HEPATITIS B IMMUNE GLOBULIN AS A PROPHYLACTIC MEASURE FOR SPOUSES EXPOSED TO ACUTE TYPE B HEPATITIS.

(Eng.) Redeker, A. G.; Mosley, J. W.; Gocke, D. J.; McKee, A. P.; Pollack, W. (John Wesley County Hosp., 2826 South Hope St., Los Angeles, CA 90007). *N. Engl. J. Med.* 293(21): 1055-1059; 1975.

A control human immune globulin preparation and one identified as HBIG (with a high concentration, 442 μg/ml, of antibodies to surface components of hepatitis B virus) were assessed in a double-blind experiment. Effectiveness was tested in 100 sexual partners of 96 patients with acute type B hepatitis. Within 150 days after injection, 9 of 33 sexual partners in the control group had symptomatic type B hepatitis, compared with 1 of 25 persons receiving HBIG. One non-B case also occurred in the HBIG group. Five control globulin recipients had evidence of subclinical hepatitis B infection, compared with one HBIG recipient. Thus, HBIG appears effective in suppressing not only disease, but also infection itself.

2149 DETECTION OF SURFACE AND CORE ANTIGENS OF HEPATITIS B VIRUS IN THE LIVER OF 164 HUMAN SUBJECTS. A STUDY BY IMMUNOPEROXIDASE AND ORCEIN STAINING.

(Eng.) Lamothe, F.; Laurencin-Piche, J.; Cote, J.; Guevin, R.; Viallet, A.; Richer, G. (Hopital Saint-Luc, 1058 St. Denis St., Montreal, Quebec, H2X 3J4, Canada). *Gastroenterology* 71(1):102-108; 1976.

Liver specimens from 126 patients hospitalized for various conditions and from 38 hepatitis B surface antigen (HBsAg) chronic carriers were investigated for the presence of HBsAg and hepatitis B core antigens (HBcAg). Orcein staining was used on fixed and frozen material and direct immunoperoxidase was used on frozen material, with antisera specific for surface (anti-HBs) and core (anti-HBc) antigens of HBV. No liver staining was found in the 98 HBsAg-seronegative patients. Among the 28 HBsAg seropositive patients, only 3 showed positive staining: 1 patient with acute viral hepatitis showed nuclear staining with anti-HBc, 2 patients with postnecrotic cirrhosis showed cytoplasmic staining with anti-HBs and/or orcein, and 1 of them also showed nuclear staining with anti-HBc. Among the 38 chronic carriers, 25 showed positive cytoplasmic staining with anti-HBs and/or orcein, while 1 patient (with chronic aggressive hepatitis) also showed nuclear staining with anti-HBc. Anti-HBs and orcein staining are equally sensitive and specific for the detection of HBsAg in hepatocytes; the authors attribute conflicting results to sampling error of distribution of HBsAg in small liver fragments.

2150 CAN GASTROINTESTINAL ENDOSCOPY TRANSMIT HEPATITIS B TO PATIENTS?

(Eng.) McDonald, G. B.; Silverstein, F. E. (Veterans Admin. Hosp., 4435 Beacon Ave. South, Seattle, WA 98108). *Gastrointest. Endosc.* 22(3):168-170; 1976.

Peroral endoscopy was performed on a jaundiced patient who was later found to have type B hepatitis. Before this diagnosis was made, four patients had been endoscoped with the same instrument. The endoscope had been cleansed with soapy water (0.25% hexachlorophene) and 70% isopropyl alcohol between examinations. None of the four patients developed laboratory or clinical signs of hepatitis B infection during 6 months of observation, suggesting that routine cleansing procedures may prevent passage of hepatitis virus. It is concluded that there is no practical method for sterilizing fiberoptic instruments to kill the hepatitis B virus. It is suggested that the sera of all jaundiced patients be tested for hepatitis B antigen, prior to endoscopy. If a patient is found to be positive, endoscopy should not be performed.

2151 HBsAg-NEGATIVE HEPATITIS IN A HEMODIALYSIS UNIT: RELATION TO EPSTEIN-BARR VIRUS.

(Eng.) Corey, L.; Stamm, W. E.; Feorino, P. M.; Bryan, J. A.; Weseley, S.; Gregg, M. B.; Solangi, K. (Center Disease Control, Atlanta, GA 30333). *N. Engl. J. Med.* 293(25):1273-1278; 1975.

An epidemiologic investigation was undertaken when 11 of 40 patients in a hemodialysis unit developed clinical or biochemical evidence of hepatitis during a 5-week period. The clinical disease was mild, being limited solely to dialysis patients. The incubation period was between 17-35 days, and 10 of 11 patients had been exposed to a single venous-pressure monitor before onset. Dried blood and evidence of blood reflux to the venous-pressure gauge suggested that cross-contamination of the blood of successive patients probably resulted in disease transmission. No association with the hepatitis B surface antigen or anti-hepatitis B antibody was domonstrated, but 10 of the 11 patients with elevated transaminase levels had evidence of recent exposure to Epstein-Barr virus as manifested either by Ox-cell hemolysin titers or rises in titers to viral capsid antigen. The study demonstrates a relation between clinical hepatitis, elevated transaminase levels, and serologic evidence of recent infection with Epstein-Barr virus in patients on chronic hemodialysis.

2152 SYNTHESIS RATES OF ALBUMIN AND FIBRINOGEN DURING AND AFTER ACUTE HEPATITIS. (Eng.)

Mayer, G.; Schomerus, H. (Dept. Internal Medicine, Univ. Marburg, Marburg a.d. Lahn, W. Germany). *Digestion* 13(5):261-271; 1975.

Synthesis rates of albumin and fibrinogen were determined in six patients with acute viral hepatitis and in nine control patients using a ^{14}C carbonate method that was based on the hepatic-urea cycle. Five patients were restudied several weeks after complete recovery. The mean albumin and fibrinogen synthesis rates in the control group were 238.8 and 23.5 mg/kg/day, resp. In two patients with mild courses of hepatitis and in one patient studied during the early phase of a rapid and fatal course, the albumin synthesis rate during the acute disease did not differ from controls, whereas the fibrinogen synthesis rate was slightly increased. Three patients with severe hepatitis showed a definite decrease in albumin and fibrinogen synthesis rates, the lowest value being 76 mg/kg/day for albumin and 6.3 mg/kg/day for fibrinogen. The decrease in plasma protein synthesis correlated neither with serum transaminase or bilirubin levels nor with plasma albumin or fibrinogen concentrations during the acute phase. The two patients with the lowest albumin and fibrinogen synthesis rates also showed a definite decrease of the prothrombin index during the acute phase. Both patients presented very prolonged courses of the disease. In all patients studied twice, plasma protein synthesis rates were normal after recovery. These results suggest that the synthesis of secretory proteins is decreased in severe acute hepatitis.

2153 HEPATITIS B IMMUNE GLOBULIN--PREVENTION OF HEPATITIS FROM ACCIDENTAL EXPOSURE AMONG MEDICAL PERSONNEL.

(Eng.) Grady, G. F.; Lee, V. A. (Natl. Heart and Lung Inst., Bethesda, MD 20014). *N. Engl. J. Med.* 293(21):1067-1070; 1975.

The role of antibody against hepatitis B surface antigen (HB$_s$Ag) in reducing the probability of hepatitis after accidental exposure to serum from patients with hepatitis or carriers of HB$_s$Ag was studied prospectively among 712 medical workers. One-fourth of the workers were anti-HB$_s$-positive, and less than 1% of them developed hepatitis, in contrast to 11% of those who were anti-HB$_s$-negative. Three coded immune-serum globulin preparations of varying anti-HB$_s$ titer were randomly assigned. Among 251 persons passively immunized with globulin having a conventionally low anti-HB$_s$ titer, hepatitis developed in 7% within 6 months. Comparative rates among those receiving intermediately high titer and high titer globulin, resp., were 5% and 2%. The significantly lower incidence among the latter ($p<0.05$) was offset by six additional cases, all in recipients of high titer globulin, detected when follow-up was extended to 9 months. Thus, a randomized controlled trial demonstrated a significantly lower incidence of hepatitis after accidental inoculations of high anti-HB$_s$ titer globulin than normal globulin.

2154 ALTERED ELIMINATION OF ANTIPYRINE IN PATIENTS WITH ACUTE VIRAL HEPATITIS.

(Eng.) Burnett, D. A.; Barak, A. J.; Tuma, D. J.; Sorrell, M. F. (San Francisco Sch. Medicine, San Francisco, CA 94143). *Gut* 17(5):341-344; 1976.

The plasma half-life and clearance of antipyrine was investigated in six patients during the acute phase and again during the recovery phase of viral hepatitis. Each patient served as his own control, thereby eliminating genetic factors and minimizing environmental factors that cause large interindividual variations in antipyrine elimination rates. Liver function tests, antipyrine, half-life, plasma clearance, and the apparent volume of distribution were determined in the acute and recovery period. The apparent volume of distribution of antipyrine did not change in five of the six patients as they recovered. Five of the six patients showed prolonged plasma half-lives and decreased plasma clearance of the drug at the time of acute illness, and these parameters reached normal values during recovery. The plasma half-life and clearance of the drug did not correlate with biochemical indices of liver function in the acute or recovery phase. This supports the concept that drug metabolism is frequently impaired in liver disease.

2155 5'-NUCLEOTIDE PHOSPHODIESTERASE ISOENZYME IN PATIENTS WITH HEPATITIS B INFECTION.

(Eng.) Tsou, K. C.; McCoy, M. G.; Lo, K. W.; London, W. T. (Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *Cancer Res.* 35(9):2361-2364; 1975.

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The etiologic relation of hepatitis B infection to hepatoma was investigated by studying the interrelations between hepatitis B surface antigen (HBsAg, Australia antigen) and the fast-moving 5'-nucleotide phosphodiesterase Band V isoenzyme (5'-NPDase-V) isolated from the sera of 58 patients with viral hepatitis, 34 patients with hepatoma, and 31 carriers of HBsAg. The isoenzyme was found in 34 of 37 patients who were also positive for HBsAg but in only 4 of 21 hepatitis patients who were HBsAg-negative. Five patients convalescing from hepatitis were negative for both HBsAg and the isoenzyme. Preparative gel electrophoresis showed that these two markers were different proteins. Of the 34 hepatoma patients, 29 were positive for 5'-NPDase-V. Only one isoenzyme-positive patient was positive for HBsAg by counterimmunoelectrophoresis. However, of 16 isoenzyme-positive hepatoma patients available for radioimmunoassay, 8 were HBsAg-positive. None of 21 hepatoma samples tested for antibody to HBsAg were positive. Of 21 normal carriers of HBsAg and 10 carriers with Down's syndrome, 4 persons were detected with the isoenzyme. The results suggest that HBsAg and 5'-NPDase-V in the presence of liver damage are associated, and provide a new marker enzyme between hepatitis B infection and hepatoma.

2156 CELLULAR AND HUMORAL IMMUNITY IN VIRAL HEPATITIS. (Eng.) Lee, W. M. (Columbia Univ. Coll. Physicians, Surgeons, 630 W. 168th St., New York, NY 10032). *Am. J. Clin. Pathol.* 65(5): 866-869; 1976.

The role of the immune system in viral hepatitis is discussed. Cellular and humoral immunity combine to determine the outcome following exposure to hepatitis virus and are implicated in the proposed pathogenetic mechanism for acute and chronic hepatitis. Although antibody to hepatitis B surface antigen (HB$_s$Ag) is found in virtually all patients following recovery from hepatitis B, a cell-mediated response to HB$_s$Ag can be detected in most patients during the acute phase, and it has been suggested that this may cause the acute hepatic damage by attacking virus-infected cells. Patients who have chronic active hepatitis also frequently have cell-mediated immunity to HB$_s$Ag regardless of whether the antigen can be detected in their sera; thus, previous exposure to hepatitis B may be important in initiating the disease, even in antigen-negative cases. Cell-mediated responses to liver-specific lipoprotein, a membrane antigen, occur transiently in many patients who have acute hepatitis and are persistent in virtually all with untreated chronic active hepatitis. The relative importance and precise mechanisms of these immune responses in the pathogenesis of acute and chronic hepatitis have not been determined.

2157 HEPATITIS-B SURFACE ANTIGEN AND CIRRHOSIS IN IRAQ. (Eng.) Boxall, E. H.; Flewett, T. H.; Paton, A.; Rassam, S. W. (East Birmingham Hosp., Birmingham B9 5ST, U.K.). *Gut* 17(2):119-121; 1976.

A comparison of the sensitivity of five tests--counter immunoelectrophoresis, radioimmunoassay, and three commercial hemagglutination tests (Auscell, Hepatest, and Hepanosticon)--revealed a high incidence of hepatitis-B surface antigen (HBsAg) in patients with cirrhosis. HBsAg occurred in 37 of 64 patients with cirrhosis as opposed to 3 of 91 sex- and age-matched controls. Counter immunoelectrophoresis detected about half as many positives as all other methods; radioimmunoassay was the most sensitive. The number of positive reactions in these patients from Iraq is higher than in any previously reported series of patients with cirrhosis and 7 times higher than in a normal hospital control population. However, the incidence of HBsAg in patients does not necessarily indicate that hepatitis-B virus was the cause of the disease.

2158 DIGITAL VASOSPASM AND INFARCTION ASSOCIATED WITH HEPATITIS B ANTIGENEMIA. (Eng.) Cosgriff, T. M.; Arnold, W. J. (Brooke Army Medical Center, San Antonio, TX). *JAMA* 235(13):1362-1363; 1976.

The case report of a 27-yr-old woman with hepatitis B antigenemia who had a serum sickness-like syndrome associated with digital vasospasm, striking cyanosis, and subsequent infarction of the fingertips 1 month before manifesting icteric hepatitis is presented. The patient presented with arthralgia, pain in the fingertips, and a generalized, pruritic, erythematous skin eruption. Radioimmunoassay for hepatitis B antigen was positive on five separate occasions, SGOT value was 132 μU/ml, and a liver biopsy specimen showed changes of mild viral hepatitis. A skin biopsy specimen taken from the fingertip after 48 hr of prednisone treatment showed hyperkeratosis, parakeratosis, and an intra-epidermal vesicle filled with RBC and edema fluid. Icteric hepatitis occurred 1 month later, and all symptoms were resolved after 2 weeks. Because clinical improvement was observed with prednisone therapy (60 mg/day), followed by exacerbation with steroid withdrawal and prompt improvement occurred with reinstitution of steroid therapy, inflammation may have participated in the production of the digital vasospasm.

2159 PHYTOHEMAGGLUTININ-INDUCED LYMPHOCYTE TRANSFORMATION IN LIVER DISEASES AND IN ASYMPTOMATIC HBsAg CARRIERS. (Eng.) Sato, T.; Arai, S.; Nakamura, S.; Takezawa, Y. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 118(1):99-100; 1976.

Phytohemagglutinin (PHA)-induced lymphocyte transformation was studied in 66 patients with liver disease or asymptomatic hepatitis B surface antigen (HBsAg) carriers. PHA-stimulated lymphocyte transformation was impaired in acute viral hepaitis. It was significantly correlated with grades f liver cell damage as shown by prothrombin time, GOT, or SGPT. It was also lower in drug-induced epatitis and in prolonged hepatitis than in con- rols. Of asymptomatic HBsAg carriers, only those ith minimal hepatic change showed lower values in stimulation index as well as incorporated radioac- ivity.

2160 THE MYSTERIES OF VIRAL HEPATITIS. (Ger.) Deinhardt, F. (Rush-Presbyterian, St. Luke's Medical Center, Chicago, IL). *Therapiewoche* 26(5): 569-577; 1976.

2161 CURRENT PROBLEMS OF HEPATITIS. (Ger.) Kuhn, H. A. (Med. Univ.-Klinik, 8700 Wurzburg, W. Germany). *Therapiewoche* 26(5):578-588; 1976.

2162 CAN THE BLOOD-TRANSMITTED HEPATITIS PROBLEM BE SOLVED? (Eng.) Prince, A. M. (New York Hosp.-Cornell Med. Cent., NY). *Ann. N.Y. Acad. Sci.* 240:191-200; 1975.

2163 TYPE A HEPATITIS. (Eng.) Mosley, J. W. (John Wesley County Hosp., 2826 S. Hope St., Los Angeles, CA 90007). *Med. Clin. North Am.* 59(4):831-834; 1975.

2164 GENETIC MIMICRY BY HEPATITIS B VIRUS. (Eng.) Mazzur, S. (American Natl. Red Cross, Blood Res. Lab., 9321 Old Georgetown Road, Bethesda, MD 20014). *Nature* 261(5558):316-317; 1976.

2165 VIRAL INFECTION MIMICKING GENETIC PATTERNS. (Eng.) Zuckerman, A. J. (No affiliation given). *Nature* 261(5558):275-276; 1976.

2166 ACTIVE AND PASSIVE IMMUNIZATION OF VIRAL HEPATITIS. (Eng.) Ginsberg, A. L. (George Washington Univ. Sch. Medicine, 2150 Pennsylvania Ave., Washington, DC 20037). *Med. Clin. North Am.* 59(4):857-862; 1975.

2167 SIGNIFICANCE OF SOME TESTS IN THE OBJECTIVE ASSESSMENT OF COMPLETENESS OF RECOVERY IN INFECTIOUS HEPATITIS IN CHILDREN. (Rus.) Dauksh, I. A.; Bolobonkin, V. G.; Uzbekova, Kh. Z. (Uzbek Scientific Res. Inst. Pediatrics, USSR). *Pediatriia* (6):51-53; 1975.

2168 PROPHYLAXIS OF SERUM HEPATITIS IN CHILDREN. (Rus.) Blagoslovenskii, G. S.; Gol'zand, I. V.; Rodionovskaia, T. F.; Kalinova, E. S.; Zimovskaia, N. I.; Nazarevskaia, O. V. (Leningrad Scientific Res. Inst. Infectious Diseases in Children, Leningrad, USSR). *Pediatriia* (6):33-36; 1975.

2169 DETECTION OF AUSTRALIA SH ANTIGEN AND ANTIBODY IN CHILDREN WITH VIRAL HEPATITIS. (Ukr.) Kapkova, Z. I.; Chernikh, A. A. (Kharkov Medical Inst., Kharkov, USSR). *Pediatr. Akush. Ginekol.* 37(4):21-22; 1975.

2170 THE CLINICAL SIGNIFICANCE OF HEPATITIS B VIRUS ANTIGENS AND ANTIBODIES. (Eng.) Holland, P. V.; Alter, H. J. (Blood Bank Dept., Natl. Inst. Health, Bethesda, MD 20014). *Med. Clin. North Am.* 59(4):849-855; 1975.

2171 MORE ANTIGENS IN HEPATITIS B. (Eng.) Zuckerman, A. J. (London Sch. Hygiene, Tropical Medicine, London, England). *Nature* 253(5486): 13; 1975.

2172 CLINICO-PATHOGENETIC SIGNIFICANCE OF CORTICOSTEROID METABOLISM IN VIRAL HEPATITIS OF CHILDREN. (Rus.) Bokovoi, A. G.; Uchaikin, V. F.; Fedotov, V. V.; Zubikova, I. I.; Sliusarenko, E. N. (N. I. Pirogov 2nd Moscow Medical Inst., Moscow, USSR). *Pediatriia* (6):42-47; 1975.

2173 HEPATITIS B ANTIGEN IN LIVER CIRRHOSIS AND HEPATOCELLULAR CARCINOMA. (Hun.) Bartok, I.; Decastello, A. (Peterfy Sandor utcai Korhaz, Budapest, Hungary). *Orv. Hetil.* 116(23):1323-1326; 1975.

2174 SERUM ALPHA-FETOPROTEIN IN VIRAL HEPATITIS AND ITS COMPLICATIONS. (Eng.) Esposito, R.; Pollavini, G.; de Lalla, F. (Inst. Infectious Diseases, Univ. Milano, Via Livigno 3-20158, Milano, Italy). *Boll. Ist. Sieroter. Milan* 55(1):59-64; 1976.

See also, 2180, 2200, 2215.

LIVER AND BILIARY TRACT

Chronic Hepatitis

2175 CHRONIC ACTIVE HEPATITIS AS A SYSTEMIC DISEASE. (Rus.) Aprosina, Z. G.; Tareev, E. M.; Bezprozvannyi, B. K.; Potekaeva, M. A.; Traianova, T. G.; Lenchik, V. I. (I. M. Sechenov 1st Moscow Medical Inst., Moscow, USSR). *Ter. Arkh.* 47(4):127-138; 1975.

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The clinico-laboratory and morphologic characteristics of chronic active hepatitis (CAH) and its accompanying immunogenetic disorders were studied in 100 patients. The multisystemic involvement of CAH was noted in the associated abdominal pain (61%), diabetes mellitus (3%), and muscular syndromes (14%), and it was confirmed by certain laboratory findings, particularly by the marked cytopenia. Hypergammaglobulinemia greater than 2 g% was established in 93% of the patients, and it correlated with a reticuloplasmocytic bone marrow reaction in 17 of 30 patients, with plasmoreticular hyperplasia of the lymph nodes in 8 of 13 patients, and with lymphoid-plasmocytic infiltration of the liver in the majority of patients. Upon initial examination, 74 of 100 patients were diagnosed with cirrhosis of the liver. Because the morphologic picture of chronic aggressive hepatitis precedes or may coexist with the morphologic picture of liver cirrhosis, it complicated CAH diagnosis; the combination and degree of expression of clinical and laboratory symptoms seen in CAH patients also make differential diagnosis necessary. The presence of disturbances in humoral immunity in CAH was confirmed by hypergammaglobulinemia (93%), reflecting growth in the antibody level, by the rheumatoid factor in blood serum (40.3%), and by the positive test for lupus erythematous cells (51%). Systemic manifestations were observed more frequently in CAH accompanied by Australia (Au) antigen in blood serum than in the absence of Au-antigen, suggesting the role of viral injury to various organs and tissues in CAH. The cytopathic action of lymphocytes on fibroblast culture and the inhibition of leukocyte migration on Au-antigen attests to the presence of delayed hypersensitivity reactions in the pathogenesis of CAH and particularly to the state of specific delayed hypersensitivity to Au-antigen.

2176 ANTIBODY-DEPENDENT CELL-MEDIATED (K CELL) CYTOTOXICITY AGAINST ISOLATED HEPATOCYTES IN CHRONIC ACTIVE HEPATITIS.

(Eng.) Cochrane, A. M. G.; Moussouros, A.; Thomson, A. D.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp., Medical Sch., London SE5 9RS, England). *Lancet* 1 (7957):441-444; 1976.

Experiments were conducted to determine whether hepatocellular damage in chronic active hepatitis is dependent upon the production of antibody to liver-specific membrane lipoprotein (LSP), rather than to autoreactive T lymphocytes. Lymphocytes from 12 of 17 patients with chronic active hepatitis were cytotoxic to isolated hepatocytes in a microcytotoxicity assay. Enriched fractions of B cells, prepared by removal of E-rosetted cells, were cytotoxic in all 12 cases, whereas T-cell fractions, prepared by removal of RBC antibody-complement-rosetted cells, were cytotoxic in only 1 case ($p<0.0005$). Hepatitis B surface antigen positive and negative cases reacted similarly. In six patients, the addition of 5 μg of aggregated immunoglobulin G significantly reduced cytotoxicity from 54% ± 15 to 13% ± 15, suggesting that K cells may be the effector cells in an antibody-dependent, cell-mediated reaction directed against liver-specific membrane lipoprotein.

2177 T CELLS AND B CELLS IN HBsAg-POSITIVE PATIENTS WITH CHRONIC PERSISTENT HEPATITIS AND ASYMPTOMATIC CARRIERS.

(Eng.) Ishimaru, H.; Ito, K.; Nakagawa, J.; Fukase, M. (Kyoto Univ. Sch. Medicine, Kyoto, Japan). *Ann. Intern. Med.* 84(4): 444-445; 1976.

The percentages of thymus- and bone marrow-derived lymphocytes (T and B cells, resp.) were determined in hepatitis B surface antigen (HBsAg)-positive patients (five of whom were asymptomatic carriers and five had chronic persistent hepatitis). The percentage of lymphocytes that formed rosettes spontaneously with sheep RBC (E rosettes, i.e., T cells) was reduced in the 5 patients with chronic hepatitis as compared with 10 normal subjects (mean, 41.6 versus 25.9). In HBsAg-positive patients with chronic persistent hepatitis, the number of E rosettes did not increase in the presence of HBsAg, nor did the reduced number of E rosettes reflect the increased numbers of B cells. The decreased number of E rosettes in the peripheral blood may reflect the diminished numbers of T cells that are associated with cellular immunity. The number of B cells in these patients was within the normal range, as were T and B cells in the five HBsAg-positive asymptomatic carriers.

2178 THE STATE OF THE KALLIKREINOGEN-KALLIKREIN SYSTEM IN PATIENTS WITH LIVER DISEASE.

(Rus.) Paskhina, T. S.; Bondar, Z. A.; Krinskaia, A. V.; Melkumova, I. S.; Polikarpova, E. G. (Inst. Biological Medical Chemistry, Moscow, USSR). *Klin. Med. (Mosk.)* 53(8):9-15; 1975.

Kallikreinogen and kallikrein levels and arginine-esterase (ethyl ester Nα-benzoyl-L-arginine) activity in the blood serum were determined in patients (aged 24-78 yr) with cirrhosis of the liver (24), fatty hepatosis changing to cirrhosis (13), and chronic hepatitis in the acute stage (6). Kallikrein activity and kallikreinogen content were measured by the original chromatographic method, based upon their separation as "cation" albumin from other trypsin-like proteinases of the blood serum and other components of the kinin system. Kallikreinogen content was lowered in all patients, particularly in those with portal and mixed cirrhosis and in those with fatty hepatosis changing to cirrhosis; kallikreinogen was 15-20% of the norm during the active phase of the disease, as compared with a level of 30-60% of the norm in patients with chronic hepatitis. Following prednisolone therapy, kallikreinogen rose to 80% of the norm in chronic hepatitis and mixed cirrhosis patients, 60% in patients with portal cirrhosis, and not more than 40% in patients with biliary cirrhosis. Free kallikrein, absent in the blood serum of healthy subjects, was found in a quantity of 10-100 Mache units (M.u.)/ml in approximately 60% of patients with an active disease course and a kallikreinogen level not below 50-60 M.u./ml. The significant variability in arginine-esterase activity, reflecting the summary activity of trypsin-like proteases in the blood serum, confirms the lack of coordination between the coagulatory, fibrinolytic, and kinin systems in liver diseases.

2179 EFFECT OF PYROGENAL ON THE INTRACELLULAR METABOLISM AND PHAGOCYTIC ACTIVITY OF LEUKOCYTES IN PATIENTS WITH CHRONIC LIVER DISEASE. (Rus.) Petrova, T. R.; Ponomareva, E. P. (Red Army Medical Inst. Kuban, Krasnodar, USSR). *Klin. Med. (Mosk.)* 53(8):34-39; 1975.

Thirty-seven patients with chronic hepatitis and 38 patients with portal and postnecrotic cirrhosis of the liver were administered pyrogenal, to determine its effect on the intracellular metabolism and phagocytic activity of leukocytes. Individualized dosages causing a 1-1.5 degree temperature increase were given i.v. on alternate days. Pyrogenal stimulated the processes of intracellular neutrophil metabolism. Elevated glycogen content in neutrophils was decreased in 63 of the patients following therapy, while increased alkaline phosphatase activity of neutrophils was further intensified, and glycolysis was strengthened. Acid phosphatase activity of neutrophils was markedly raised in the majority of patients with chronic hepatitis, and it was moderately raised in patients with cirrhosis. Therapy significantly raised the level of nucleic acids in neutrophils ($p<0.001$) in 69 of the patients. In these patients, decreased total content of albumin was accompanied by low phagocytic intensity. The data indicate that pyrogenal positively affects the functional activity of leukocytes.

2180 CHRONIC HEPATITIS. (Eng.) Redeker, A. G. (Univ. Southern California Sch. Medicine, 2826 S. Hope St., Los Angeles, CA 90007). *Med. Clin. North Am.* 59(4):863-867; 1975.

2181 RECENT ACHIEVEMENTS IN CHRONIC HEPATITIS: HISTOLOGICAL BASES, PATHOGENETIC CRITERIA, DIAGNOSIS, PROGNOSIS AND THERAPY. (Ita.) Pani, A. (Reparto di Medicina Generale, Ospedali Riuniti, Reggio Calabria, Italy). *Clin. Ter.* 73(2):103-112; 1975.

2182 AUTOIMMUNITY IN HEPATITIS. (Eng.) Plotz, P. H. (Natl. Inst. Arthritis, Metabolism and Digestive Diseases, Natl. Inst. Health, Bethesda, MD 20014). *Med. Clin. North Am.* 59(4):869-876; 1975.

2183 CHANGES IN THE LEVEL OF CERULOPLASMIN AND TRANSFERIN IN CHILDREN HAVING SUSTAINED HEPATITIS. (Rus.) Ionkov, S.; Karapanchev, B.; Chakyrov, I. (I. P. Pavlov Faculty Medicine, Khisar, USSR). *Pediatriia* (6):48-49; 1975.

See also, 2135, 2147, 2149, 2156, 2174, 2186, 2218.

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LIVER AND BILIARY TRACT

Alcoholic Liver Disease

2184 DETERMINANTS OF DERANGED SODIUM AND WATER HOMEOSTASIS IN DECOMPENSATED CIRRHOSIS. (Eng.) Epstein, M.; Pins, D. S.; Schneider, N.; Levinson, R. (Veterans Admin. Hosp., 1201 N.W. 16 St. Miami, FL 33125). *J. Lab. Clin. Med.* 87(5): 822-839; 1976.

Mechanism(s) responsible for the abnormalities of renal sodium and water handling in advanced alcoholic liver disease were investigated in 13 patients (aged 37-54 yr) who were housed in an environmentally controlled metabolic ward at constant temperature. Each patient consumed a daily diet of 10 mEq sodium, 100 mEq potassium, and 800-1,000 ml water. All patients underwent a contol study followed, 2-3 days later, by immersion in water to the neck level. Subsequently, patients underwent additional control and immersion studies following chronic spironolactone therapy (100-400 mg/day) for a minimum of 5 days. Immersion resulted in a marked natriuresis and kaliuresis in the majority of patients with decompensated Laennec's cirrhosis and avid renal sodium retention. The marked increase in sodium excretion during immersion plus spironolactone administration, as compared to the modest increase in sodium excretion after spironolactone administration alone, indicates that the major component of the natriuresis is secondary to enhanced distal delivery of filtrate. This is supported by a concomitant kaliuresis and an increase in free H_2O clearance. These findings support the concept that the pre-existing sodium-retaining state was secondary to decreased distal delivery, and that hyperaldosteronism was a permissive factor. Immersion induced a sustained increase in central blood volume in the absence of infusion exogenous volume expanders, supporting the theory that the abnormal sodium retention in cirrhosis is mediated by some parameters of diminished effective blood volume. Immersion was also capable of inducing a prompt and remarkable "normalization" of creatinine clearance in a majority of patients with diminished creatinine clearance, suggesting that immersion may reverse the elevated renal vascular tone in cirrhosis.

2185 HEPATIC COLLAGEN PROLINE HYDROXYLASE ACTIVITY IN ALCOHOLIC LIVER DISEASE. (Eng.) Mezey, E.; Potter, J. J.; Maddrey, W. C. (Baltimore City Hosp., 4940 Eastern Ave., Baltimore, MD 21224). *Clin. Chim. Acta* 68(3):313-320; 1976.

The activity of hepatic collagen proline hydroxylase was examined in biopsy samples as a factor in collagen synthesis in 77 patients with alcoholic liver disease. Patients with alcoholic hepatitis (47) had the highest mean activity of hepatic collagen proline hydroxylase, while the activity of the enzyme was markedly increased in patients with nonspecific changes (6) on liver biopsy. In patients with fatty infiltration of the liver (17), the enzyme activity was increased to above normal only when expressed per mg of protein. The patients with alcoholic hepatitis and inactive cirrhosis showed significant elevations in the urinary excretion of peptide bound hydroxyproline, as compared to normals. Follow-up determinations in 16 patients revealed a decrease in the enzyme activity but no change in urinary hydroxyproline. The decrease in the mean enzyme activity was not related to histologic changes or to prednisolone (40 mg/day) therapy. These findings are consistent with the clinical observation that alcoholic hepatitis often progresses to cirrhosis.

2186 LIVER DISEASE--A PROMINENT CAUSE OF SERUM IgE ELEVATION. (Eng.) Van Epps, E.; Husby, G.; Williams, R. C., Jr.; Strickland, R. G. (Univ. New Mexico, Sch. Medicine, Albuquerque, NM 87131). *Clin. Exp. Immunol.* 23(3):444-450; 1976.

Using radioimmunoassay, serum IgE concentrations were found to be elevated in 37 out of 67 patients with acute or chronic liver disease of differing etiology. In these patients, the mean IgE concentrations showed an eight-fold increase above that observed in control subjects. In patients with liver disease, increased IgE levels occurred in the absence of eosinophilia, clinical evidence of atopy, or other known causes of IgE elevation. No IgE-containing plasma cells were detected in the liver biopsies from 32 patients. Peripheral blood T cells were significantly decreased from normal in the patients with liver disease, but no correlation emerged between serum IgE levels and absolute peripheral blood T-cell numbers. These findings emphasize the importance of liver disease as a significant cause of serum IgE elevation.

2187 A CONTROLLED STUDY OF THERAPEUTIC PORTACAVAL SHUNT IN ALCOHOLIC CIRRHOSIS. (Eng.) Rueff, B.; Prandi, D.; Degos, F.; Sicot, J.; Degos, J. D.; Sicot, C.; Maillard, J. N.; Fauvert, R.; Benhamou, J. P. (Hopital Beaujon, 922110 Clichy, France). *Lancet* 1(7961):655-659; 1976.

A controlled study of therapeutic end-to-side portacaval shunt was carried out in 89 patients with alcoholic cirrhosis. Significantly fewer patients with the shunt had recurrent bleeding; 6 out of 25 developed gastrointestinal bleeding in comparison with 36 of 49 patients who did not have the operation ($p < 0.001$). Chronic hepatic encephalopathy was more common in the shunt group (6 of 24) than in the control group (0 of 36, $p < 0.001$). The survival rate was lower, but not significantly, in patients with shunts. No overall benefit of the operation was demonstrated in cirrhotic patients, using the selection criteria and the type of surgical shunt in this study.

2188 VALUE OF GAMMA-GLUTAMYL TRANSPEPTIDASE DETERMINATION IN THE DIAGNOSIS OF CHRONIC ALCOHOLISM. (Fre.) Caridroit; Plaquet; Lamy; Rosalki (Service de Clinique psychiatrique et de desintoxication ethylique readaptation, CHU 59000 Lille, France). *Med. Chir. Dig.* 4(3):155-158; 1975.

2189 FUNCTIONAL STATUS OF THE LIVER IN ALCOHOLISM. (Rus.) Kalestru, N. V. (Kishinev Republican Psychiatric Hosp. No. 1, Kishinev, USSR). *Sov. Med.* (9):151-152; 1975.

2190 ALCOHOL-RELATED DEATHS IN THE WEST OF IRELAND. (Eng.) O'Brien, M. J.; Kennedy, J. D.; Little, M. P. G. (Regional Hosp., Galway, Ireland). *Irish. J. Med. Sci.* 144(8):293-303; 1975.

2191 BIOPSY-PROVEN LIVER DISEASE RELATED TO ALCOHOL AND DRUG ABUSE: INCIDENCE AND DEMOGRAPHY IN USAREUR IN 1970 AND 1973. (Eng.) Mark, E. J. (Dept. Pathology, USAREUR Medical Lab., Germany). *Med. Bull.* 32(8):253-254; 1975.

2192 ALCOHOLIC CIRRHOTIC ASCITES: SHOULD DIURETICS BE PRESCRIBED? (Fre.) Michel, H.; Raynaud, A. (Hop. Saint-Eloi, Montpellier, France). *Concours Med.* 98(2):147-152; 1976.

2193 ALCOHOLIC HEPATITIS WITH LEUKEMOID REACTION. (Eng.) Wallach, H.; Jacobs, J. (Veterans Admin. Hosp., Atlanta, GA). *South Med. J.* 68(10): 1266-1278; 1975.

2194 ALCOHOL AND MALNUTRITION IN THE PATHOGENESIS OF LIVER DISEASE. (Eng.) Lieber, C. S. (Veterans Admin. Hosp., Bronx, NY). *JAMA* 233(10): 1077-1082; 1975.

See also, 2077, 2202.

LIVER AND BILIARY TRACT

Cirrhosis

2195 DIAGNOSIS OF CIRRHOSIS AND HEPATITIS BY QUANTITATIVE HEPATIC AND OTHER RETICULOENDOTHELIAL CLEARANCE RATES. (Eng.) DeNardo, S. J.; Bell, G. B.; DeNardo, G. L.; Carretta, R. F.; Scheibe, P. O.; Imperato, T. J.; Jackson, P. E. (Univ. California Sch. Medicine, Sacramento, CA 95817). *J. Nucl. Med.* 17(6):449-459; 1976.

A kinetic radionuclide technique for quantitative assessment of colloid clearance rate constants for the liver, spleen, and other reticuloendothelial (RE) tissues is described. The technique was used to differentiate cirrhosis, fatty metamorphosis, hepatitis, and normal function in 22 patients by utilizing ^{198}Au-colloid, *in vivo* organ counting, and kinetic computer modeling to provide a quantitative assessment of clearance rate constants. The actual plasma clearance rates were determined by substituting blood volume for plasma volume. In normal subjects, the mean clearance rate constants for the liver, spleen, and extra hepatosplenic reticuloendothelial system were 16.0, 1.4, and 3.4 ml/min/100 ml of plasma, resp. The mean hepatic clearance rate constant was normal in hepatitis (16.8 ml/min/100 ml), reduced in cirrhosis (5.7), and slightly reduced in fatty metamorphosis (10.4). Both the hepatic to splenic and the hepatic to extrahepatosplenic ratios of clearance rate constants were reduced in cirrhosis (3.9 and 0.8) and were slightly reduced in fatty metamorphosis (11.9 and 2.6) and hepatitis (13.9 and 3.3). The splenic clearance rate constants were normal in these three diseases. It is concluded that this method compares well with clearance blood flow results reported by other investigators using other techniques.

2196 PERCUTANEOUS HAM-SPLENOPORTOSCINTIGRAPHY, PORTA-SYSTEMIC SHUNTING AND HEPATIC SINUSOIDAL PRESSURE IN CIRRHOSIS OF THE LIVER. (Eng.) Weits, J.; Gips, C. H.; Beekhuis, H.; Kruizinga, K.; Niermeijer, P.; Piers, D. A. (Univ. Hosp., The Netherlands). *Neth. J. Med.* 18(5):176-183; 1975.

Percutaneous splenoportoscintigraphy (SPS), using ^{99m}Tc-human albumin microspheres (HAM), was performed in patients with liver cirrhosis, and the results were compared with parameters of portal pressure and porta-systemic (p-s) shunting. HAM were injected percutaneously into the spleen as a small bolus using a short thin needle. HAM-SPS was successfully performed in 36 of 38 patients, with no complications. Pulmonary imaging indicating p-s shunting was found in 17 patients. There was a positive correlation ($p = 0.02$) between pulmonary imaging and an abnormal rectal arterial ammonia test. Pulmonary imaging as well as delayed visualization of the liver were associated ($p = 0.001$ and $p < 0.01$, resp.) with a hepatic sinusoidal pressure greater than or equal to 8 mm Hg (marked portal hypertension). Hepatic sinusoidal pressure increased with increasing spleen-lung interval. Pulmonary imaging did not correlate with the presence or absence of esophageal varices, with vertebral column imaging on i.v. ^{99m}Tc-colloid scintigraphy (conventional liver scintigraphy), or with distension of portal venous tributaries, as observed during peritoneoscopy. It is concluded that SPS be recommended in those cases where information is desired on the portal venous system, on the presence or absence of porta-systemic shunts, and on the probability of marked portal hypertension.

2197 INCOMPLETE MEMBRANOUS OBSTRUCTION OF THE INFERIOR VENA CAVA: HEMODYNAMIC MEASUREMENTS AND CORRECTION BY BALLOON MEMBRANOTOMY AND SURGICAL RESECTION. (Eng.) Horisawa, M.; Yokoyama, T.; Juttner, H.; Reynolds, T. B. (Nagoya Univ. Sch. Medicine, Nagoya, Japan). *Arch. Surg.* 111(5):599-602; 1976.

The case of a 38-yr-old man with rare membranous obstruction of the inferior vena cava (IVC) at the level of the diaphragm is described. The patient had chronic liver disease and portal hypertension, initially thought to be caused by secondary biliary cirrhosis, because of a history of long-term infestation with *Clonorchis sinensis*, or by chronic active viral hepatitis, because of a positive hepatitis B surface antigen test and a history of blood transfusion. At the time of hemodynamic evaluation of portal hypertension with hepatic vein catheterization, typical membranous obstruction of the IVC was discovered and thought to be the cause of the liver disease. The obstruction was thin and incomplete, and was corrected by balloon membranotomy and surgical resection. Hepatic vein catheterization in patients with chronic liver disease and portal hypertension allows detection of this lesion as well as evaluation of hepatic and portal hemodynamics.

2198 NORMAL SERUM GASTRIN LEVELS IN PATIENTS WITH LIVER CIRRHOSIS. (Eng.) Pointner, H. (Medizinische Universitatsklinik, Lazarettgasse 14, A-1097, Wien, Austria). *Digestion* 13(6):372-374; 1975.

Serum gastrin concentrations were determined radioimmunologically after an overnight fast in 28 patients with histologically confirmed liver cirrhosis. Mean value and standard deviation in the patients with cirrhosis (30.1 ± 19.3 pg/ml) was not significantly different from the mean value established in 275 normal subjects (39.7 ± 21.3 pg/ml). It seems doubtful that the very small gastrin elevation previously reported in cirrhotic patients is responsible for the increased incidence of ulcers seen in patients with liver cirrhosis.

2199 FAMILIAL CIRRHOSIS OF VIRAL ETIOLOGY. (Rus.) Iurkovskaia, N. B. (Hosp. Infectious Diseases No. 5, Kiev, USSR). *Klin. Med. (Mosk.)* 53(8):141-143; 1975.

The death of 5 children in a family from cirrhosis of the liver accompanied by splenomegaly, within a 23-yr period, indicated a familial disease of viral etiology. Botkin's disease was diagnosed in two cases. Family pathology also included a pair of premature twins who died within several days of birth, a 1-month-old child who died from meningitis, and a 2-yr-old child who died from pneumonia. The father suffered from disseminated pulmonary tuberculosis and duodenal ulcer disease; cirrhosis was diagnosed subsequently on the basis of jaundice, and death occurred 2 yr later. Cirrhosis that follows Botkin's disease frequently retains its infectious nature, as characterized by intrafamilial epidemic hepatitis and subsequent cirrhosis.

2200 AUTOIMMUNE FACTORS IN AFRICAN CIRRHOSIS. CORRELATION WITH HEPATITIS B SURFACE ANTIGEN AND ANTIBODY. (Eng.) Sadikali, F.; Doniach, D. (Makerere Univ. Medical Sch., Kampala, Uganda). *Am. J. Gastroenterol.* 64(6):484-489; 1975.

Sera were tested for autoantibodies in 98 patients in Uganda with cryptogenic cirrhosis, and the results were correlated with serological tests for hepatitis B surface antigen (HBsAg) and antibody to HBsAg (HBsAb). Smooth muscle antibodies (SMA) were detected in 23 of the patients, but there was no difference in the incidence of SMA between HBsAg-positive and negative cases. Antinuclear antibodies (ANA) were detected in five cases; mitochondrial, gastric, and thyroid antibodies were not found in any patient. Unlike other geographical locations, autoimmune mechanisms appear to play little part in the progression of chronic liver disease in Africans from Uganda. Hepatitis B surface antigen was present in 36 and HBsAb was present in 47 of the patients. Although evidence for past exposure to hepatitis B virus (as shown by detection of HBsAb) was present in at least 30 out of the 62 HBsAg-negative cases, there was no greater incidence of autoantibodies in HBsAg-negative patients with or without HBsAb. Persistent infection with hepatitis B virus and continuing liver damage may be an important factor, but these results do not suggest that the virus plays a role in the etiology of chronic liver disease by triggering an autoimmune reaction.

2201 INCREASED URINARY EXCRETION OF L-XYLULOSE IN PATIENTS WITH LIVER CIRRHOSIS. (Eng.) Oka, H.; Suzuki, S.; Suzuki, H.; Oda, T. (Univ. Tokyo, Faculty Medicine, Bunkyo-ku, Tokyo, Japan). *Clin. Chim. Acta* 67(2):131-136; 1976.

The urinary excretions of L-xylulose, xylitol, and D-glucarate after the p.o. administration of glucuronolactone (5 g) were measured in 14 healthy persons, 8 patients with diabetes mellitus, 9 patients with acute hepatitis in recovery stage, 10 patients with chronic hepatitis, and 14 patients with liver cirrhosis. In normal subjects, the mean value of L-xylulose excretion, measured by an enzymatic method, was 14.6 μmol/2 hr with a range from 6.5 to 21.8. Marked increase of L-xylulose excretion was observed in cirrhotic patients; the mean value was 97.1 ± 19.8, with a range from 22.0 to 236.6. Though some cases of acute and chronic hepatitis showed higher values than the normal range, no case exceeded 50 μmol/2 hr. The urinary excretion of xylitol, assayed by gas chromatography, in cirrhotic patients was also higher than normal, and no increase was observed in D-glucarate excretion. The values of L-xylulose excretion in cirrhosis were correlated with the values of serum total bilirubin (r=0.88), albumin (r=-0.73), albumin/globulin ratio (r=-0.69), lactate dehydrogenase (r=0.91), and prothrombin time (r=0.73). These findings indicate that the measurement of L-xylulose in urine after p.o. glucuronolactone loading provides a useful tool for evaluating the severity of liver cirrhosis.

2202 HYPOTHALAMIC-PITUITARY-GONADAL FUNCTION IN MEN WITH CIRRHOSIS OF THE LIVER. (Eng.) Mowat, N. A. G.; Edwards, C. R. W.; Fisher, C. R.; McNeilly, A. S.; Green, J. R. B.; Dawson, A. M. (Woodend General Hosp., Aberdeen, U.K.). *Gut* 17(5):345-350; 1976.

Hypothalamic-pituitary-gonadal function was studied in 37 cirrhotic men, 25 of whom were alcoholic. In

ddition to the measurement of hormone concentra-
ions under basal conditions, hormone responses to
ynamic tests of hypothalamic-pituitary-gonadal
unction were also assessed. Irrespective of
tiology, cirrhotic patients had significantly
educed free testosterone concentrations. Despite
ow free testosterone concentrations and reduced
r absent spermatogenesis, basal levels of lu-
einizing hormone (LH) and follicle stimulating
ormone (FSH) were normal in nearly all patients,
uggesting impaired function of the hypothalamic-
ituitary-gonadal axis. In 14 cirrhotic men, 7 of
hom had gynecomastia, the ability of the pituitary
o secrete LH and FSH in response to exogenous
onadotrophin releasing-hormone (LH/FSH-RH) was
ssessed. A normal LH response to LH/FSH-RH was
btained in patients without gynecomastia. An
xaggerated LH response was found in four of seven
ith gynecomastia, suggesting Leydig cell failure..
The Leydig cell response to exogenous gonadotrophin
in eight consecutive cirrhotic patients was prob-
ably abnormal but difficult to interpret, as all
but one were within conventionally accepted limits
of normality. The patients without gynecomastia
gave a normal or minimally exaggerated FSH response
to LH/FSH-RH. Six of seven with gynecomastia gave
a markedly exaggerated response, suggesting failure
of spermatogenesis, and all tested were either
azoospermic or oligospermic. The single patient with
a normal FSH response had a normal sperm count.
Therefore, the pituitary cells response to LH/FSH-
RH, and the Leydig cells of the testes show response
to exogenous gonadotrophin.

2203 *Pasteurella multocida* PERITONITIS IN HEPATIC CIRRHOSIS WITH ASCITES.

(Eng.) Gerding, D. N.; Khan, M. Y.; Ewing, J. W.; Hall, W. H. (Veterans Admin. Hosp., 54th St. and 48th Ave. South, Minneapolis, MN 55417). *Gastroenterology* 70(3):413-415; 1976.

Cases of *Pasteurella multocida* peritonitis in association with cirrhosis and ascites are described in two men, aged 51 and 62 yr. Both patients had close contact with domestic animals, but neither had been bitten. *P. multocida* was the only organism isolated from the ascitic fluid in both patients. Despite treatment with oxygen, albumin, and plasma, the second patient died within hours of admission. The first patient recovered from peritonitis after treatment with clindamycin and gentamicin, but he died after developing increased hepatic and renal failure. Autopsy revealed no bowel perforations; micronodular cirrhosis, fatty metamorphosis, and alcoholic hepatitis were observed in the liver. *P. multocida* should be considered as a possible cause of peritonitis in cirrhotic patients with a history of close contact with animals, particularly cats. It is suggested that when *P. multocida* infection is suspected, empiric antibiotic selection should include penicillin G because of its proven efficacy and low toxicity.

2204 SPLANCHNIC HEMODYNAMICS IN CIRRHOTIC PATIENTS WITH ESOPHAGEAL VARICES AND GASTROINTESTINAL BLEEDING.

(Eng.) Lebrec, D.; Kotelanski, B.; Cohn, J. N. (Unite de Recherches de Physio-Pathologie Hepatique (INSERM), Hopital Beujon, 92110 Clichy, France). *Gastroenterology* 70(6):1108-1111; 1976.

The relation between hemodynamics and portal hypertension was investigated in 20 cirrhotic patients with esophageal varices and gastrointestinal bleeding within the previous week. The patients underwent hemodynamic studies, using an indicator dilution technique based upon selective catheterization of the splanchnic arteries and hepatic vein. Portasystemic shunting of splenic arterial flow was accomplished in 16 of 20 patients (78%). Two of three patients whose bleeding was not due to varices had no detectable shunting of splenic inflow, and in the third, a 25% shunt was detected. Systemic shunting of superior mesenteric arterial flow was more variable and averaged 59% for the entire group. In 25%, mesenteric shunting was essentially complete, but in the other 15 patients varying fractions (10-100%) of mesenteric flow continued to perfuse the liver. No shunting was detected in three patients with nonvariceal bleeding. There was no correlation between the severity of the portal hypertension, as assessed from the pressure gradient, and the fraction of mesenteric flow passing through the portasystemic collateral circulation. Hepatic blood flow also varied. Arteriovenous oxygen difference across the liver averaged 3.4 ml/100 ml. Hepatic venous oxygen content was not related to the percentage of portasystemic shunting. All patients had cardiac indices over 3.4 $l/min/m^2$. These data indicate the variability of the splanchnic hemodynamic pattern that may exist in alcoholic patients with esophageal varices. If hemodynamic factors are important in determining the response to surgery, indicator dilution studies to quantitate portasystemic shunting may be a vital part of preoperative evaluation.

2205 LITHOCHOLATE METABOLISM DURING CHENOTHERAPY FOR GALLSTONE DISSOLUTION. 2. ABSORPTION AND SULPHATION.

(Eng.) Allan, R. N.; Thistle, J. L.; Hofmann, A. F. (Dept. Medicine, Birmingham Univ., Birmingham, England). *Gut* 17(6):413-419; 1976.

The amount of lithocholate input and the size of the total lithocholate exchangeable pool were measured using isotope dilution in three patients who ingested chenodeoxycholic acid (mean dose 11.0 mg/kg/day, minimum of 6 months) for gallstone dissolution and in two healthy control subjects. Because the specific activity decay curve was biexponential in appearance, input was calculated using a stochastic analysis employing the Stewart-Hamilton equation. By this method, the lithocholate input and the size of the exchangeable pool in gallstone patients during chenic acid ingestion was four to five times that observed in the healthy control subjects. It was calculated that about one-fifth of the newly formed

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lithocholate was absorbed in both gallstone patients and healthy control subjects. The extent of sulfation of absorbed lithocholate was then measured in seven gallstone patients who had been ingesting chenodeoxycholic acid for gallstone dissolution. This was accomplished by defining the chemical form of radioactivity in bile after i.v. administration of labeled lithocholate. Similar studies were carried out in eight healthy control subjects, but, in addition, the extent of sulfation of injected lithocholylglycine and lithocholyltaurine was also defined. When lithocholate was injected, the majority of radioactivity in bile (50-60%) was present as sulfated conjugates, both in gallstone patients and in healthy control subjects. The degree of sulfation was greater for glycine than taurine conjugates; these findings, suggesting preferential sulfation of the glycine conjugates of lithocholate, were confirmed by showing that injected lithocholylglycine was sulfated to a much greater extent than injected lithocholyltaurine. The results indicate that in patients receiving chenic acid, there is effective sulfation of lithocholate, especially its glycine conjugates, despite a considerable increase in lithocholate absorption; they may provide an explanation for the lack of hepatotoxicity of chenic acid in man.

2206 SPONTANEOUS BACTERIAL EMPYEMA IN CIRRHOSIS.

(Eng.) Flaum, M. A. (Veterans Admin. Hosp., West Haven, CT). *Gastroenterology* 70(3): 416-417; 1976.

A case of spontaneous bacterial empyema occurring in a 48-yr-old man with cirrhosis and long-standing pleural effusion is reported. The patient presented with jaundice, hepatomegaly, ascites, and massive right pleural effusion 1 yr before the bacterial empyema was encountered. At that time, thoracentesis yielded sterile fluid with a high number of WBC; 1 yr later, thoracentesis yielded purulent fluid, which, when cultured, yielded *Escherichia coli*. Cultures of ascitic fluid and blood were sterile. A left pleural effusion developed, and it yielded results similar to those of the right effusion. Cultures of pleural fluid became sterile following large doses of ampicillin and tube thoracostomy drainage, but the patient died after the development of portalsystemic encephalopathy and gastrointestinal bleeding. Autopsy showed advanced micronodular cirrhosis with hepatosplenomegaly and ascites. This case suggests that transudates other than ascites can be infected in a manner similar to ascites.

2207 ABNORMAL VITAMIN D METABOLISM IN PATIENTS WITH CIRRHOSIS.

(Eng.) Hepner, G. W.; Roginsky, M.; Moo, H. F. (Harbor General Hosp., Torrance, CA 90509). *Am. J. Dig. Dis.* 21(7):527-532; 1976.

To assess the role of hepatic function and alcohol on vitamin D metabolism, serum 25-hydroxyvitamin D (25-OHD) levels were measured in 20 healthy nonalcoholic control subjects, 31 "inactive" cirrhotics whose alcoholism was in remission, 8 alcoholic cirrhotics, and 15 alcoholics with normal liver function. Cirrhosis, but not alcoholism, was associated with low serum 25-OHD levels. The aminopyrine breath test (ABT) was performed because aminopyrine, like vitamin D_3, is metabolized by hepatic microsomes; the ABT correlated highly ($p<0.01$) with serum 25-OHD in the inactive cirrhotics. After an i.v. injection of 120 μg vitamin D_3, serum 25-OHD rose significantly within 24 hr in healthy controls and two patients with celiac disease but not in six inactive cirrhotics. These data suggest that impaired 25-hydroxylation of vitamin D in patients with cirrhosis is related to the degree of hepatic dysfunction.

2208 REVERSIBILITY OF SEVERE HEPATIC DAMAGE CAUSED BY JEJUNOILEAL BYPASS AFTER RE-ESTABLISHMENT OF NORMAL INTESTINAL CONTINUITY.

(Eng.) Soyer, M. T.; Ceballos, R.; Aldrete, J. S. (Sch. Medicine, Univ. Alabama, Birmingham, AL). *Surgery* 79(5):601-604; 1976.

The case of a 24-yr-old woman who underwent a jejunoileal bypass operation and developed severe hepatic damage is presented. The damage was reversed after re-establishment of the normal intestinal continuity. Following the initial bypass operation, the patient developed jaundice and abnormal liver function tests. A needle biopsy of the liver, 1 yr after the bypass, revealed severe hepatic cirrhosis. The normal intestinal continuity was subsequently restored, and cholecystectomy, appendectomy, and excision of a benign ovarian cyst were performed during the same operation. The patient's liver function tests returned to normal. When surgery was again performed 8 months later, to repair the incarceration of several loops of intestine in an incisional hernia, the liver showed only minimal residual abnormalities.

2209 PRIMARY BILIARY CIRRHOSIS IN SISTERS.

(Eng.) Chamuleau, R. A. F. M.; Van Berge Henegouwen, G. P.; Bronkhorst, F. B.; Brandt, K.-H. (Dept. Internal Medicine, Binnengasthuis, Univ. Amsterdam, Netherlands). *Neth. J. Med.* 18(5):170-175; 1975.

2210 HEPATOCIRCULATORY FAILURE.

(Eng.) Cohn, J. N. (Univ. Minnesota Sch. Medicine, Minneapolis, MN 55455). *Med. Clin. North Am.* 59(4): 955-962; 1975.

2211 PORTAL HYPERTENSION.

(Eng.) Resnick, R. H. (Harvard Medical Sch., 25 Shattuck St., Boston, MA 02115). *Med. Clin. North Am.* 59(4):945-953; 1975.

2212 ALPHA$_1$-ANTITRYPSIN PHENOTYPES IN CHRONIC ACTIVE LIVER DISEASE AND PRIMARY BILIARY CIRRHOSIS. (Eng.) Kueppers, F.; Dickson, E. R.; Summerskill, W. H. J. (No affiliation given). *Mayo Clin. Proc.* 51(5):286-288; 1976.

2213 PORTAL SURGERY AND LIVER FUNCTION: A NEW LOOK AT AN OLD PROBLEM. (Eng.) Galambos, J. T.; Warren, W. D.; Rudman, D. (Emory Univ. Sch. Medicine, 69 Butler St., SE, Atlanta, GA 30303). *Mt. Sinai J. Med.* 43(3):219-225; 1976.

2214 TREATMENT OF CIRRHOTIC ASCITES. (Fre.) Emerit, J. (Centre de Gastro-Enterologie, Hopital de la Salpetriere, 47, bd de l'Hopital, 75634 Paris Cedex 13, France). *Entretiens Bichat Ther.* 1975:143-147.

2215 DIETETIC STRATEGIES IN ACUTE AND CHRONIC LIVER DISEASES. (Ita.) Morettini, A.; Allamani, A.; Bartoletti, L.; Boddi, V.; Burroni, A.; De Cecco, A.; Gabbrielli, M.; Ghetti, A.; Pacini, F.; Chibbaro, G. (Arcispedale di Santa Maria Nuova, Florence, Italy). *Recent Prog. Med. (Roma)* 59(2): 157-181; 1975.

2216 MORPHOGENESIS OF CONGESTIVE FIBROSIS OF THE LIVER. (Rus.) Filippova, L. A.; Tikhonova, G. N. (Leningrad Medical Inst. Sanitation Hygiene, Leningrad, USSR). *Arkh. Patol.* 37(3):37-47; 1975.

2217 SOMATOMEDIN IN CHRONIC LIVER DISEASE. (Cze.) Marek, J.; Schullerova, M.; Schreiberova, O. (III. interni klinika fakulty vseobecneho lekarstvi, Universita Karlova, 128 21 Prague 2, U nemocnice 1, Czechoslovakia). *Cas. Lek. Cesk.* 115(7):209-212; 1976.

2218 FATTY ACID COMPOSITION OF LIPID FRACTIONS OF THE BLOOD SERUM IN PATIENTS WITH CHRONIC DISEASES OF THE LIVER. (Rus.) Markova, M. N.; Loginov, A. S. (Central Scientific Res. Inst. Gastroenterology, Moscow, USSR). *Ter. Arkh.* 47(2):84-92; 1975.

2219 THERAPY OF COMA IN LIVER CIRRHOSIS. (Ita.) Manenti, F.; Ferrari, A. (Istituto di Clinica Generale e Terapia Medica, Universita di Modena, Modena, Italy). *Clin. Ter.* 73(1):3-12; 1975.

See also, 1677, 1817, 1818, 2091, 2094, 2121, 2157, 2173, 2178, 2179, 2186, 2190.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

2220 CLINICO-ROENTGENOLOGICAL EVALUATION OF NEGATIVE CHOLECYSTOGRAPHY. (Rus.) Ginsburg, S. N.; Kagan, Iu. L. (N. A. Semashko Moscow Medical Stomatologic Inst., Moscow, USSR). *Vestn. Rentgenol. Radiol.* (2):58-62; 1975.

Infusion cholegraphy was performed in 205 patients with negative cholecystography. The gallbladder contrast range was absent in 128 patients during both procedures. In three of these cases, the contrast range was absent simultaneously in the gallbladder and the bile ducts. In 125 of these cases, obliteration or detachment of the gallbladder was diagnosed. The gallbladder contrast range was insufficient for diagnosis in 11 of the 205 patients and it was sufficient in 66 patients. All patients who underwent surgery had pathologic changes causing negative cholecystography: calculus cholecystitis was found in 107 of 109 patients, and phlegmonous cholecystitis without calculus was found in 2 of the 109 patients. Negative cholecystography was almost always (96.5%) caused by cholelithiasis and its accompanying organic changes at the bladder neck and duct.

2221 REFLUX CHOLANGIOGRAPHY IN SPHINCTEROPLASTY OR ENTEROBILIARY ANASTOMOSIS. (Eng.) Bilbao, M. K.; Dotter, C. T. (Univ. Oregon Medical Sch., Portland, OR 97201). *Radiology* 115(2):585-588; 1975.

The effectiveness of reflux cholangiography, a simple modification of hypotonic duodenography, was evaluated in five patients with sphincteroplasties and in four patients with enterobiliary anastomoses. The procedure involved rapid, controllable duodenal intubation, drug-induced paralysis, distension with a contrast agent, and radiography after gravity-induced reflux through the fistula. Satisfactory demonstration of the hypotonic duodenum and the enterobiliary anastomosis was achieved in all cases. The authors conclude that in patients with abnormal enterobiliary communications, this method is effective for demonstrating not only biliary and pancreatic ducts, but also fistulas, the duodenum, and the papilla of Vater. The technique is uncomplicated and is suitable for the serial study of chronic conditions. In addition, it is useful for surgical evaluation as a preliminary to more complex procedures and enhances the value of endoscopic retrograde cholangiopancreatography.

2222 VALUE OF GALLBLADDER B-SCAN ULTRASONOGRAPHY.

(Eng.) Tabrisky, J.; Lindstrom, R. R.; Herman, M. W.; Castagna, J.; Sarti, D. (Harbor General Hosp., 1000 West Carson St., Torrance, CA 90509). *Gastroenterology* 68(5):1246-1252; 1975.

The usefulness of gallbladder B-scan ultrasonography was evaluated in 20 patients who had a poor or nonvisualization of the gallbladder after a cholecystogram, sufficiently abnormal liver chemistries to render conventional radiography futile, and a precarious clinical condition requiring emergency laparotomy. Eleven patients demonstrated a normal scan with smooth walls and clear sonolucency; there were 5 false negatives in this group; 3 of them were caused by small stones (under 8 mm). Two patients in the group had alcoholic hepatitis and two had impeded iopanoic acid absorption causing nonvisualization. Four patients showed no identifiable sonolucency in the gallbladder region; all had large numbers of stones. Five patients showed an irregular wall and/or internal echoes. Patients in this group had gangrenous and nongangrenous cholecystitis, hydrops of the gallbladder, malignant neoplasm, and cholelithiasis. It is concluded that the B-scan can be a valuable test for confirming the significance of a radiographically nonvisualized gallbladder or for detecting a biliary tract lesion in a condition that precludes conventional radiographic visualization.

2223 BILE PERITONITIS IN ACUTE CHOLECYSTITIS.

(Eng.) Dale, G.; Solheim, K. (Ulleval Hosp., Oslo, Norway). *Acta Chir. Scand.* 141(8): 746-748; 1975.

Three cases of bile peritonitis in acute cholecystitis are presented, and a further 17 cases, occurring over a 15-yr period, are reviewed. Because x-ray examination was of little diagnostic use, the correct diagnosis was suggested preoperatively in only nine cases. The fundus of the gallbladder was the most frequent site of perforation, although in one case the bile seemed to escape through the inflamed gallbladder wall. There was no specific symptom in any of the cases of gallbladder perforation, although most patients had signs of generalized peritonitis. The patients were an average of 72 yr old and represented 1.8% of 1,123 patients with acute cholecystitis admitted during the 15-yr period. Three patients did not undergo surgery, and all died. Mortality with cholecystostomy was 4 of 11, with cholecystectomy it was 1 of 4, and with cholecystectomy and exploration of common duct it was 0 of 2. It is recommended that early operative treatment of acute cholecystitis be chosen whenever possible.

2224 LITHOCHOLATE METABOLISM DURING CHENOTHERAPY FOR GALLSTONE DISSOLUTION. 1. SERUM LEVELS OF SULPHATED AND UNSULPHATED LITHOCHOLATES.

(Eng.) Allan, R. N.; Thistle, J. L.; Hofmann, A. F.; Carter, J. A.; Yu, P. Y. S. (Dept. Medicine, Birmingham Univ., Birmingham, England). *Gut* 17(6):405-412; 1976.

Serum levels of total sulfated and total unsulfated lithocholates were each measured by a specific radioimmunoassay in 66 patients who ingested chenodeoxycholic (chenic) acid (mean dose, 13 ± 6 mg/kg/day; range, 6-25 mg/kg/day, 12 months) for gallstone dissolution and in 35 gallstone patients who ingeste either cholic acid or placebo. No changes occurred in serum lithocholate levels in the control groups. In patients ingesting chenic acid, there was a twofold increase in serum levels of total lithocholate, but the percent sulfation (>75%) remained unchanged during chenotherapy. There was no correlation in the chenic acid-treated group between serum lithocholate levels and the proportion of lithocholate in biliary bile acids or changes in serum SGOT. The data suggest that there is effective sulfation of lithocholate in such patients; this may explain the lack of hepatotoxicity observed during ingestion of chenic acid.

2225 DIURNAL CHANGES OF BILE LIPID CONCENTRATION IN HEPATIC BILE OF CHOLECYSTECTOMIZED MAN.

(Eng.) Gerolami, A.; Crotte, C.; Reynier, M. O.; Mule, A.; Domingo, N.; Sarles, H. (Unite de Recherches de Pathologie digestive, Inserm, 46, chemin de la Gaye, F-13009 Marseille, France). *Digestion* 12(4-6):209-220; 1975.

Diurnal variations of bile lipid concentration were studied in 10 patients with a T tube in the main bil duct following a cholecystectomy. Five or 6 bile sa ples were collected every 24 hr from each patient during 3-40 days. The enterohepatic cycle was not significantly modified because total bile samples did not exceed 40 ml/day. Significant diurnal variations were observed in cholesterol concentration. Changes in lecithin concentration seemed to be similar in seven patients but they did not reach the level of significance in any individual patient. Maximal values were observed between 4 and 8 a.m. and minimal values at 4 p.m. Bile salt concentration varied without any circadian periodicity. The patients with highest cholesterol concentrations also had the highest mean lecithin concentration. There was little variation in bile salt concentration from one patient to another. It is concluded that individual and circadian variations of bile lipids can modify the bile saturation in cholesterl by parallel changes of lecithin and cholesterol oncentration, without corresponding changes in bile alt concentration.

226 CHOLELITHIASIS IN CHILDREN. (Eng.) Harned, R. K.; Babbitt, D. P. (Univ. ebraska Sch. Medicine, Omaha, NB). *Pediatr. adiol.* 117(2):391-393; 1975.

he association of cholelithiasis with hemolytic nemia in children was reviewed in 367 cases. emolytic disease was associated with the cholelithiasis in 69 cases; sickle cell disease and pherocytosis were the most common types. Oral holecystograms were diagnostic in about 70% of he cases, and plain film studies were also of iagnostic value as 56 of 110 patients had gallstones isible on plain radiographs of the abdomen. The esults show that cholelithiasis is more common in hildren without hemolytic disease than in those with emolytic anemia.

2227 PENETRATION OF CLINDAMYCIN PHOSPHATE INTO THE ABNORMAL HUMAN BILIARY TRACT. (Eng.) Brown, R. B.; Martyak, S. N.; Marza, M.; Curtis, L.; Weinstein, L. (Peter Bent Brigham Hosp., 721 Huntington Ave., Boston, MA 02115). *Ann. Intern. Med.* 84(2):168-170; 1976.

Following the i.v. administration of clindamycin (600 mg) in 14 patients undergoing biliary tract surgery (37 with complete obstruction of the common bile duct), concentrations of the drug were measured in gallbladder and common bile duct, gallbladder wall, liver, and serum. Patients with patent common ducts had high levels of active drug at all hepatobiliary sites; concentrations were 2.5-3 times higher in bile and liver than in serum. Persons with obstruction of the common duct had no measurable drug in bile and had reduced levels in gallbladder wall; however, concentrations in the liver were slightly higher than those in the group without obstruction. The results suggest that, even in the presence of common duct obstruction, the concentrations of active clindamycin in the liver may be sufficient to limit the spread of intrahepatic infections due to susceptible organisms.

2228 RESULTS OF EMPLOYMENT OF CHOLEVID FOR ORAL CHOLECYSTOCHOLANGIOGRAPHY. (Rus.) Shamliian, A. P. (Armavir Regional Hosp.) *Vrach. Delo* (5):94-97; 1975.

2229 FUNCTIONAL X-RAY DIAGNOSIS OF CHRONIC STONE-FREE CHOLECYSTITIS. (Rus.) Trakhtman, M. I. (Donetsk Medical Inst., Donetsk, USSR). *Vestn. Rentgenol. Radiol.* (2):53-58; 1975.

2230 CLINICAL INTERPRETATION OF ROENTGENOLOGICAL DATA IN PATIENTS WITH CHOLECYSTITIS. (Rus.) Skripnichenko, D. F.; Mamchich, V. I. (Kiev Inst. Postgraduate Training Physicians, Kiev, USSR). *Vrach. Delo* (6):9-12; 1975.

2231 EVALUATION OF THE USEFULNESS OF SERUM LIPOPROTEIN-X (LP-X) DETECTION TEST FOR THE DIAGNOSIS OF CHOLESTASIS IN CHRONIC LIVER DISEASES. (Pol.) Milewski, B.; Palynyczko, Z. (Klinika Gastroenterologii i Przemiany Materii CMKP, 02-616 Warsaw, ul. Goszczynskiego 1, Poland). *Pol. Arch. Med. Wewn.* 53(5):445-452; 1975.

2232 INDIVIDUAL DIFFERENCES IN THE POSITION OF THE GALLBLADDER AND EXTRAHEPATIC BILE DUCTS WITH RESPECT TO SELECTION OF AN OPERATIVE APPROACH. (Rus.) Varlamov, V. I.; Synovets, A. S.; Morozov, B. D.; Krasnitskii, V. K. (N. P. Pirogov Odessa Medical Inst., Odessa, USSR). *Vestn. Khir.* 115(7):40-44; 1975.

2233 ROUTINE OPERATIVE CHOLANGIOGRAPHY DURING CHOLECYSTECTOMY. (Eng.) Duff, J. H. (Div. General Surgery, Univ. Western Ontario, London, Ontario, Canada). *Can. J. Surg.* 18(5):399-400; 1975.

2234 ENDOSCOPIC CATHETERIZATION OF THE AMPULLA OF VATER. (Fre.) Archambault, A.; Giroux, Y.; Farley, A.; Bourgie, J.; Bessette, G.; Mheir, H. (Hopital Maisonneuve-Rosemont, 5415, boul. de l'Assomption, Montreal HIT 2M4, Canada). *Union Med. Can.* 105(1):61-62; 1976.

2235 ACUTE CHOLECYSTITIS--WHEN TO OPERATE. (Eng.) Wiltrakis, G. A.; Liesen, G. J.; Wiltrakis, M. G. (No affiliation given). *J. Abdom. Surg.* 17(788):182-185; 1975.

2236 CLINICAL OBSERVATIONS AFTER CHOLECYSTECTOMY. (Eng.) Steinitz, H. (Gastroenterologic Clinic, 27, Blvd., Ben-Zion, Tel-Aviv, Israel). *Med. Chir. Dig.* 4(5/6):271-276; 1975.

2237 RESULTS OF CHOLECYSTECTOMY IN 1000 CONSECUTIVE PATIENTS. (Eng.) MacLean, L. D.; Goldstein, M.; MacDonald, J. E.; Demers, R. (Royal Victoria Hosp., Canada, Winnipeg, Canada). *Can. J. Surg.* 18(5):459-468; 1975.

2238 CHOLECYSTECTOMY FOR THE PREVENTION OF CANCER. (Ger.) Jager, V. (Krankenhaus Penig und Rochlitz, E. Germany). *Zentralbl. Chir.* 100(10):626-627; 1975.

2239 THE CONDITION OF THE LIVER IN PATIENTS WITH SUPRADUODENAL CHOLEDOCHODUODENOSTOMY. (Rus.) Filimonov, M. I.; Ambartsumian, R. G.;

Palinkashi. D. G.; Kravchenko. N. I. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (4):114-119; 1975.

2240 CONDITION OF THE BILE DUCTS AT DIFFERENT PERIODS AFTER SUCCESSFUL SURGICAL TREATMENT OF CHOLELITHIASIS. (Rus.) Kishkovskii, A. N.; Nechai, A. I.; Lantsov, V. P.; Mitin, V. V. (S. M. Kirov Acad. Military Medicine, Leningrad, USSR). *Vestn. Rentgenol. Radiol.* (2):62-66; 1975.

2241 ABERRANT ASCARIASIS IN THE COMMON BILE DUCT AND THE VERMIFORM APPENDIX. (Eng.) Liu, F. J.; Tseng, C. H. (Ju-Feng Surgical Hosp., Taiwan, Rep. China). *Abdom. Surg.* 17(11/12):255-256; 1975.

2242 CHOLERESIS, CHOLERETICS AND BILE DUCT MOTILITY. (Ger.) Bode, J. C. (Medizinische Klinik, Univ. Marburg, Mannkopffstrasse, I, D 355 Marburg/Lahn, Germany). *Tijdschr. Gastroenterol.* 18(1):35-48; 1975.

2243 BILE ACIDS IN CLINICAL MEDICINE: HEPATOBILIARY DISEASE, GALLSTONES, HYPERLIPIDEMIAS, AND GASTRITIS. (Eng.) Scudamore, H. H. (Monroe Clinic, Monroe, WI 53566). *Wis. Med. J.* 75(5):S42-S44; 1976.

2244 DOUBLE BARRELLED COMMON BILE DUCT: A THREAT TO BILIARY SURGERY. (Eng.) Viotk, A. J. (Dept. Surgery, Univ. Manitoba, Winnipeg, Canada L3V 3C9). *Am. J. Surg.* 13(5):611-613; 1976.

2245 BIOLOGICAL CHARACTERISTIC OF PROTEUS MICROBES ISOLATED FROM BILE IN SUPPURATIVE INFLAMMATORY DISEASES OF THE BILE SECRETING SYSTEM. (Rus.) Ordzhonikidze, Z. V. (No affiliation given). *Soobshch. Akad. Nauk Gruz. S.S.R.* 80(1):185; 1975.

2246 BONE CHANGES IN INTRAHEPATIC BILIARY ATRESIA. (Eng.) Raghaverndra, B. N.; Genieser, N. B. (New York Univ. Medical Center, 560 First Ave., New York, NY 10016). *Br. J. Radiol.* 49(578):179-181; 1976.

2247 BILIARY CYSTS. (Eng.) Flanigan, D. P. (St. Joseph Mercy Hosp., 326 North Ingalls St., Ann Arbor, MI 48102). *Ann. Surg.* 182(5):635-643 1975.

2248 FUNCTIONAL STATUS OF THE BILE SECRETING SYSTEM IN PATIENTS GASTRECTOMIZED FOR CANCE (Rus.) Zavgorodnii, L. G.; Kharabeniush, V. A.; Sycheva, V. V. (Clinic General Surgery No. 1, A. M. Gor'kii Donetsk Medical Inst., Donetsk, USSR). *Klin. Khir.* (11):44-49; 1975.

2249 ON THE RELATIONSHIP OF CHOLELITHIASIS TO CARCINOMA OF THE GALL-BLADDER AND ON THE SEX DEPENDENCY OF THE CARCINOMA OF THE BILE DUCTS: A STUDY BASED ON THE AUTOPSY DATA FROM 1928 TO 1972. (Eng.) Parkash, O. (Wilhelminen Hosp., 16 Montlearstrasse 37, A-1171 Vienna, Austria). *Digestion* 12(3):129-133; 1975.

2250 DILATATION OF THE GALL-BLADDER SIMULATING A TUMOUR IN THE RIGHT ILIAC FOSSA: A CASE REPORT. (Eng.) Genell, S.; Jonsson, K. (General Hosp., Malmo, Sweden). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 124(4):388-389; 1976.

2251 PAPILLOMA OF THE GALLBLADDER. (Eng.) Aoki, Y.; Okamura, T.; Kurimoto, H.; Taniguchi, K. (Izumiohtsu City Hosp., Izumiohtsu, Osaka 595, Japan). *Am. J. Surg.* 13(5):614-617; 1976.

2252 LYMPHOBLASTIC RETICULOSARCOMA OF THE GALLBLADDER. (Rus.) Pogorzhel'skii, V. I.; Karpiuk, L. A.; Gruzkova, G. V. (Dept. Pathological Anatomy, Municipal Hosp., Rovno, USSR). *Vrach. Delo* (1):68-69; 1976.

See also, 1773, 1930, 2022, 2037, 2046, 2048, 2054, 2066, 2115, 2122.

GENERAL

2253 GASTRIN CONTENT AND GASTRIN RELEASE: STUDIES ON THE ANTRAL CONTENT OF GASTRIN AND ITS RELEASE TO SERUM DURING STIMULATION BY FOOD. (Eng.) Malmstrom, J.; Stadil, F. (Rigshospitalet, 2100 Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(Suppl. 37):71-76; 1976.

The antral and serum gastrin concentrations were studied in eight patients with various gastrointestinal diseases during a 30-min intragastric instillation of meat extract (bovril). Bovril caused a steady increase in serum concentrations of gastrin and an acute fall in the antral content of gastrin to 42 ± 8.4% during the first 10 min. After 10 min, the antral content increased again to the basal values. No change in gastrin components was detected; component III (gastrin-17) constituted over 95% of the antral gastrins throughout the 30-min period. The serum gastrin response to a steak meal was higher in 22 duodenal ulcer patients than in 9 normal subjects, and it was higher postoperatively in 8 patients who were studied before and after truncal vagotomy. In the duodenal ulcer patients with the highest antral content of gastrin, the serum response to food was higher only during the early phase of the feeding response. It is concluded that the gastrin content of the antral mucosa represents an acute releasable pool of gastrin-17, which contributes only to the first 10-15 min of the feeding response. It does not reflect the total amount of gastrin released into the circulation during feeding.

2254 SUCCESSFUL TREATMENT OF A MALIGNANT GASTRINOMA WITH STREPTOZOTOCIN.

(Eng.) Hayes, J. R.; O'Connell, N.; O'Neill, T.; Fennelly, J. J.; Weir, D. G. (Sir Patrick Duns Hosp., Dublin, Ireland). *Gut* 17(4):285-288; 1976.

The treatment of a 36-yr-old woman with metastatic gastrinoma with streptozotocin is described. Two courses of i.v. streptozotocin showed no effect (two doses of 0.8 g and two doses of 1.6 g, separated by 7 days; four doses of 2 g, each separated by 7 days). However, 3 months after two doses of 4 g streptozotocin were given into the celiac axis, there was a marked reduction in hepatic size and a fall in fasting plasma gastrin levels from 1,430 pmol/l to 240 pmol/l. Seven months after treatment, fasting plasma gastrin levels were 125 pmol/l. Three years after treatment, the patient remains well. This treatment may be valuable in the management of the metastatic complications of malignant gastrinoma.

2255 EFFECT OF EPINEPHRINE AND NOREPINEPHRINE ON GASTRIN RELEASE AND GASTRIC SECRETION OF ACID IN MAN.

(Eng.) Christensen, K. C.; Stadil, F. (Rigshospitalet, 2100 Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(Suppl. 37):87-92; 1976.

The physiological importance of epinephrine and norepinephrine for gastrin release and gastric secretion of acid was studied in 49 patients with duodenal ulcer or with normal stomach and duodenum. Twenty patients received 5 ng/kg/min epinephrine i.v. over 1 hr; 18 patients received 50 ng/kg/min, and norepinephrine was given to the remaining 11 patients, who received both 5 and 50 ng/kg/min. The low dose of epinephrine stimulated gastrin release and acid secretion, whereas the high dose stimulated the gastrin release but did not change acid secretion. Norepinephrine in the low dose caused a very small increase in gastrin release and no change in acid secretion, whereas the high dose inhibited acid secretion without any change in gastrin concentration. No postoperative change was observed in the release of gastrin by both doses of epinephrine after truncal vagotomy in six and seven patients with duodenal ulcer. It is concluded that both epinephrine and norepinephrine may be of importance in the physiological regulation of gastrin release and gastric acid secretion.

2256 CLINICAL RESPONSE OF DERMATITIS HERPETIFORMIS SKIN LESIONS TO GLUTEN-FREE DIET.

(Eng.) Heading, R. C.; Paterson, W. D.; McClelland, D. B. L.; Barnetson, R. S. C.; Murray, M. S. M. (Royal Infirmary, Edinburgh, Scotland). *Br. J. Dermatol.* 94(5):509-514; 1976.

The effect of a gluten-free diet (GFD) on the control of dermatitis herpetiformis-associated skin lesions was assessed prospectively for 2 yr in 26 patients on GFD and in 16 patients on a normal diet. Daily requirements for p.o. medication with sulfapyridine or dapsone were significantly reduced in patients on GFD, as compared to the statistically insignificant reduction observed in patients on a normal diet. If complete clinical remission occurred, it was maintained while the GFD was strictly observed; however, complete remission did not occur significantly more often in GFD-treated patients than in patients on a normal diet. GFD treatment seems desirable for the majority of patients with dermatitis herpetiformis, not only to correct the intestinal abnormality but also to minimize the dose of drugs necessary to control the skin lesions.

2257 PHASE II STUDY OF METHYL-CCNU (NSC-95441) IN ADVANCED GASTROINTESTINAL CANCER.

(Eng.) Engstrom, P. F.; Catalano, R. B.; Creech, R. H. (American Oncologic Hosp., Philadelphia, PA 19111). *Cancer Treat. Rep.* 60(3):285-287; 1976.

The effectiveness and toxicity of 1-(2-chloroethyl)-3-(4-methyl-cyclohexyl)-1-nitroso-urea (methyl-CCNU) were evaluated in 47 patients with advanced gastrointestinal adenocarcinoma. All patients received 200 mg/m^2 of body surface area methyl-CCNU p.o. after a 2-hr fast. Courses were repeated every 49 days until evidence of disease progression occurred. Complications included nausea (which could be ameliorated with chlorpromazine) and severe pancytopenia; the latter occurred in patients with extensive liver metastases or in those who had received previous radiotherapy or chemotherapy, and were thus given less than their predicted methyl-CCNU dosage. Although none of 26 patients with colorectal carcinoma showed complete or partial tumor regression, 5 experienced stabilization of the disease. Of 13 patients with metastatic gastric carcinoma, 1 had a 6-month complete regression of metastases. Measurable antitumor activity was seen in 2 of 11 patients with metastatic pancreatic carcinoma. Thirty-two patients showed no significant antitumor effect. The use of methyl-CCNU in combination with other active drugs in the treatment of gastrointestinal adenocarcinoma is being investigated.

2258 GASTRIN RESPONSE TO FOOD AFTER THREE TYPES OF INTESTINAL SHUNT OPERATIONS FOR OBESITY.

(Eng.) Dano, P.; Stadil, F. (Rigshospitalet, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(Suppl. 37):93-97; 1976.

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The basal and food-stimulated serum concentrations of gastrin and gastric secretion of acid were studied in 28 patients following 3 types of intestinal shunt operation for obesity. In each type, 48 cm of functioning small intestine was preserved, but the ratio between functioning jejunum and ileum was different (9 patients with proximal 36 cm of jejunum anastomosed to the distal 12 cm of ileum, 8 patients with anastomosis between 24 cm of proximal jejunum and 24 cm of terminal ileum, and 11 patients with the anastomosis between 12 cm of proximal jejunum and 36 cm of terminal ileum). The basal and stimulated concentrations of gastrin in serum were significantly higher in patients with the shortest jejunum in function. There was no difference in the gastric acid output. The results suggest that gastrin participates in evoking the gastric hypersecretion of acid following massive bowel resection or bypass. Deprivation of a hormonal inhibitory substance from the upper jejunum may be responsible for the increased serum gastrin concentration.

2259 VARIANTS OF LIPEMIC CURVES IN ACUTE DIGESTIVE DISTURBANCES IN INFANTS. (Rus.) Ignatov, S. I. (Clinic Pediatric Diseases, Lvov Medical Inst., Lvov, USSR). *Pediatriia* (11):33-34; 1975.

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2261 TREATMENT OF ZOLLINGER-ELLISON SYNDROME WITH METIAMIDE OR CIMETIDINE: POTENTIAL RISK OF MANIFESTATIONS OF HYPERIMMUNIZATION. (Fre.) Moulias, R.; Congy, F. (Faculte de Medecine Pitie-Salpetriere, 91, bd de l'Hopital, F 75634 Paris Cedex 13, France). *Nouv. Presse Med.* 5(3):149-150; 1976.

2262 LEVELS OF LIPID FRACTIONS IN THE BLOOD SERUM OF CHILDREN DURING THE FIRST YEAR OF THEIR LIVES AND IN CHRONIC NUTRITIVE DISTURBANCES. (Rus.) Riabchuk, F. N.; Nikolaeva, T. G.; Lavut, L. M. (Leningrad Inst. Postgraduate Training of Physicians. Leningrad, USSR). *Pediatriia* (11):28-31; 1975.

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See also, 1800, 1805, 1973, 2040, 2043, 2094, 2203.

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Parasitology

2284 IMMUNOLOGICAL STUDIES IN HUMAN SCHISTOSOMIASIS. I. PARASITIC ANTIGEN IN URINE. (Eng.) Carlier, Y.; Bout, D.; Bina, J. C.; Camus, D.; Figueiredo, J. F. M.; Capron, A. (Service d' Immunologie et de Biologie Parasitaire, U.E.R. de Medecine, Lille, France). *Am. J. Trop. Med. Hyg.* 24(6):949-954; 1975.

Circulating antigens were investigated by immunodiffusion in sera and urines from 132 patients with *Schistosoma mansoni* infections. The occurrence of a thermostable parasitic urinary antigen, called M, was demonstrated in 80% of infected patients. The incidence of M component was proportional to the fecal egg count and was inversely proportional to the age of the patient. Specific anti-M precipitating antibodies were demonstrated in 41% of sera from infected patients. A statistical correlation was found between the presence of M antigen and the level of total and anti-*S. mansoni* IgE, and also with the 24-hr intradermal test response with *S. mansoni* antigen. M antigen was not detected in serum. This may be due to the fact that sera were only concentrated 3-fold in these experiments, whereas the urines were concentrated at least 1,000-fold; alternatively, the M antigen may be complexed with specific antibodies in the serum.

2285 SIMPLIFIED TREATMENT OF INTESTINAL PARASITOSIS CAUSED BY PROTOZOA, CESTODA, AND NEMATHELMINTHES. (Spa.) Biagi, F.; Smyth, J.; Gonzalez, C. (No affiliation given). *Prensa Med. Mex.* 40(5/6):189-192; 1975.

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2292 DIAGNOSIS AND EFFICIENT TREATMENT OF TAENIASIS. (Fre.) Junod, C. (39, rue Saint-Dominique, 75007 Paris, France). *Rev. Prat.* 26(8):572-574; 1976.

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See also, 1745, 1818, 1975.

2301 USE OF AN ELEMENTAL DIET FOR LONG-TERM NUTRITIONAL SUPPORT IN CROHN'S DISEASE. (Eng.) Goode, A.; Hawkins, T.; Feggetter, J. G. W.; Johnston, I. D. A. (Univ. Dept. Surgery, Newcastle Upon Tyne NE1 4LP, U.K.). *Lancet* 1(7951):122-124; 1976.

An elemental diet, consisting of amino acids with glucose, minerals, fat, and vitamins, was used for long-term (up to 360 days) nutritional support in eight patients with Crohn's disease. They had lost 30% (range 18-37%) of their weight while they were healthy. A whole-body monitor was used to measure total body potassium as an index of the lean tissue mass. Three preoperative patients who had been unable to maintain their weight on a normal diet were able to restore 10% per month of their lost lean tissue once they were established on an elemental diet. In five patients who had a successful resection of their bowel lesion, the postoperative rate of restoration of the lean tissue mass, while taking an elemental diet, was 18.5% per month, while in two control postoperative patients on a normal diet, it was 19% per month. The results indicate that elemental diets have a major therapeutic role in the arrest and reversal of chronic weight-loss.

2302 CROHN DISEASE AND PREGNANCY. (Eng.) Homan, W. P.; Thorbjarnarson, B. (New York Hosp.-Cornell Medical Center, 525 E. 68th St., New York, NY 10021). *Arch. Surg.* 111(5):545-547; 1976.

Seventy-eight married women of childbearing age (15-44 yr) with Crohn's disease were studied. Thirty-five patients had borne 50 children before the onset of their disease. There were 42 pregnancies in 26 women following the diagnosis of Crohn's disease, leaving 67% of the patients termed "subfertile" or "infertile." The site of the primary disease was not related to fertility. There were 31 pregnancies resulting in a living child. There were two elective abortions, one therapeutic abortion, seven spontaneous abortions, two cesarean sections, one stillbirth, one premature (<36 wk) birth, and 28 full-term vaginal deliveries. Thirty-two pregnancies occurred during a quiescent phase of the disease, and of these, a mild exacerbation during the pregnancy developed in three cases. Pregnancy occurred during the active phase of the disease in 10 patients. In 10 pregnancies (in eight patients), the postpartum course was characterized by exacerbation of the disease. It appears that the outcome of pregnancies in patients with Crohn's disease are statistically similar to that of the general population. Results indicate that pregnancy did not exert an adverse effect on the disease, itself, but termination of pregnancy was associated with relapse of Crohn's disease 24% of the time.

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2308 POSTOPERATIVE COMPLICATIONS IN CROHN'S DISEASE. (Ger.) Krieg, H.; Bruckner, R.; Loth, R. (Chirurgische Universitatsklinik, Langenbeckstrasse 1, D-65 Mainz, West Germany). *Helv. Chir. Acta.* 42(5/5):861-863; 1975.

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See also, 1767, 2031, 2035, 2040, 2278.

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GALIMOVA, L.I.
1871
GALLAGHER, N.D.
2139
GANCARZ, Z.
2300
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1883
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1927
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1558, 1610
GASKIN, R.J.
1911
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2138
GATMAITAN, Z.
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1767*, 2015, 2027
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1839
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GO, V.L.W.
1750*, 1890*
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2168
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1661*, 1702, 2123*
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1754, 1785, 1976, 1977,
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1829
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1806, 2065
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1853
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1846*, 2256*
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1921, 1922
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HELDER, A.W.
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1918
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1809
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1958
KALANT, H.
1653*
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KALINOVA, E.S.
2168
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2169
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2107
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KATZ, S.J.
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2190
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1830
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1917
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2248
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KHOMINSKAIA, Z.B.
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1876
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1785, 1976, 1977
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2009
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2222*
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1997

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2081*
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1840
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1949
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1948
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MATAS, A.J.
1660*
MATSUSHIMA, T.
1642*
MATSUSHITA, H.
2143*
MATTY, A.J.
1565*
MAUER, S.M.
1660*
MAYER, G.
2152*
MAYET, F.
1964*
MAZZUR, S.
2164
MC BRIDE, F.
1786
MCCALL, J.T.
1750*
MCCARTNEY, W.H.
1784
MCCLELLAND, D.B.L.
2256*
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2155*
MCCREADY, F.J.
2281
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1928

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1734
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1824
MCGILLIARD, A.D.
1640
MCINTOSH, C.L.
1804
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2148*
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2071*, 2110
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1728
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2293
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1775
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2083*
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2202*
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1613, 1614, 1615
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1870
MELAMED, E.
2080*
MELCHIORRI, F.
1644*
MELKUMOVA, I.S.
2178*
MELNICK, J.L.
2141*
MELOAN, S.N.
1560
MELSON, G.L.
1991
MENANTEAU, B.
1945
MENDELOFF, A.I.
2306
MENGE, H.
1552*, 1723*
MESTROVIC, J.-N.
2307
METZGER, W.H.
1849*
MEUWISSEN, J.A.T.P.
1580
MEYER, C.
1948
MEYER, T.
1726
MEZEY, E.
2185*
MHEIR, H.
2234
MICHEL, B.
2279
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2137, 2192
MICUCCI, E.
2042*
MIHAS, A.A.
1627*
MIKHAILOV, V.N.
1709
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1825
MILEV, N.
1933*
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2115, 2231
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1646
MILLER, D.J.
1746*
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1775
MILONOV, O.B.
2103
MILTON-THOMPSON, G.J.
1848*
MINO, G.
1791
MIRKOVITCH, V.
1552*, 1723*
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1848*
MITCH, W.E.
1718*
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2240
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1714*
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1654*
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2103
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1904
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1785
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1854
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2265
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1831
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1797
MONTANARO, N.
1883
MONTRASIO, P.L.
1916
MONUS, Z.
2091*
MOO, H.F.
2207*
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2118
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1583
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1674*
MOORE, J.D.
1934*
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1887*
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1672*
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1858
MOREIRA, C.A.X.
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MORELL, F.
1972
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2215
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1966*
MORISHITA, S.
1855
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1741
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2232
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2094*
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1876
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2148*, 2163
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1797
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2261
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2176*
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2103
MOWAT, N.A.G.
2202*
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1792
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2109
MUKAI, T.
1769*
MUKHERJEE, T.M.
1554*
MUKHTAR, H.
1667*
MULE, A.
2225*
MUNOZ, L.
1635
MUNRO, H.N.
1683
MURA, M.
1642*
MURALIDHARA, K.S.
1575*

MURER, H.
1573*
MURO, J.
1791
MURRAY, G.F.
1838
MURRAY-LYON, I.M.
2119
MURRAY, M.S.M.
2256*
MUSSINI-MONTPELLIER, J.
1971
MUTALIK, G.S.
2297
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1705
NAFTALIN, F.J.
1566*
NAGASUE, N.
2086*
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1660*
NAKAGAWA, J.
2177*
NAKAMURA, S.
2159*
NAKAZAWA, Y.
1676*
NANCE, D.M.
1617*
NANNI, G.
2304
NARISAWA, T.
1998
NARTOWICZ, A.
2052
NAZAREVSKAIA, O.V.
2168
NEALE, G.
1752*
NECHAI, A.I.
2240
NECHELES, H.
1901
NEDKOVA-BRATANOVA, N.
1933*
NEIRMEIJER, P.
2196*
NELSON, D.L.
1744*, 1962*
NELSON, E.W.
1980
NETAKHATA, Z.N.
1897
NEUHAUS, G.W.
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NIAS, A.H.W.
1561
NIESSEN, K.H.
1979
NIKOLAEVA, T.G.
2262
NIKOLOV, N.
1933*
NILPRABHASSORN, P.
2082*
NISHIKAWA, M.
1855
NITTEBERG, H.
2000
NOCZYNSKI, L.
2102
NOER, T.
2013
NOGALLER, A.M.
1917
NOLAN, N.G.
1766*
NORDMANN, J.
1655*
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1655*
NORGAARD, R.P.
1981*
NORLEN, K.
1954
NORRYD, C.
1943
NOWICKA, C.
2052
NUGENT, F.W.
2303*
NUMANYU, N.
1843*
O'BRIEN, M.J.
2190
O'CONNELL, N.
2254*
O'CONNOR, P.J.
2092*
O'DRISCOLL, J.
1932
O'NEILL, T.
2254*
OBRINK, K.J.
1553*
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1732, 1733, 2201*
OESCH, I.
2001
OESTREICH, A.E.
1814
OGILVIE, B.M.
2293
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1905
OHMAN, U.
1957
OKA, H.
2201*
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2034
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1892*
OLOW, B.
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ONISHI, S.
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ONODY, K.
2036
ORCI, L.
1635
ORDZHONIKIDZE, Z.V.
2245
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2128
ORGAN, C.H., JR.
1939
ORLOWSKI, T.
1904
ORMSBEE, H.S., III
1592*
ORR, J.M.
1582
ORTIZ VAZQUEZ, J.
1791
OSTERGAARD, A.
1995
OSTROPOLET'S, S.S.
1870
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OVAKIMIAN, S.S.
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2239
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PAPPALARDO, A.
1812
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1870
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1846*
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2090*
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2280
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2056*
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1608
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1619*
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1914
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PIVINSKII, N.P.
1864
PLAQUET
2188
PLAZA, A.G.
1974
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1806
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2095*
PLIUSNINA, A.M.
1950
PLOTZ, P.H.
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1687
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2178*
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1837
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2175*
POTTER, J.J.
2185*
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1848*
POWELL, L.W.
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2187*
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1865
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2006
PROKHUR, V.Z.
1864
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1902
PROST, M.
1925
PRUGLO, I.V.
1872
PUCHALSKI, Z.
1902
PUCHTLER, H.
1560
PURCELL, R.H.
2142*
PURDHAM, D.R.
1960*
PURICELLI, G.
1811
PUVION, E.
1559
QUENTIN, E.
1821
QUERTERMUS, J.
1624*
QUIJANO, R.
1568*
RAB, S.M.
1969
RABSON, A.S.
1804
RACHMILEWITZ, D.
1712*
RADWAN, J.
1648
RAFOTH, R.J.
1794
RAGHAVERNDRA, B.N.
2246
RAGHEB, M.I.
1830
RAISER, M.
1624*
RAMACHANDRAN, S.
2099
RAMADAN, A.A.
1830
RAMASAMY, A.
1636
RAMBALDI, M.
2064
RAMEY, C.W.
1760
RAMIREZ ARMENGOL, J.A.
1861
RANA, S.
2288
RANCON, F.
1701

RANDOLPH, J.G.
1704
RAFTIS, S.
1643*
RASSAM, S.W.
2157*
RATTAN, S.
1596*
RAYNAUD, A.
2192
RECK, R.
2068
REDEKER, A.G.
2148*, 2180
REEHARDT, L.
1563
REHFELD, J.F.
1841*
REHNER, M.
2068
REICH, C.B.
1999
REID, P.E.
1760
REINHOLD, J.G.
1578
REISEGGER, W.
1825
REITZENSTEIN, M.
1751*
RENTZHOG, L.
1953, 1954
RESNICK, R.H.
2211
REY, J.
1968
REYNIER, M.O.
2225*
REYNOLDS, T.B.
2197*
RIABCHUK, F.N.
2262
RIBET, M.
1925
RICHARDSON, C.T.
1889*
RICHART, C.
1972
RICHER, G.
2147*, 2149*
RICHTER, R.M.
1997
RIM, E.
1575*
RITCHIE, H.D.
1594*
RITTER, S.B.
1820
ROBERT, A.
1624*
ROBERTS-THOMSON, I.C.
1745*
ROBERTSON, A., JR.
2279
ROBINS, S.J.
1673*
ROBINSON, J.W.L.
1552*, 1723*
ROCCA, F.
1811
RODDA, B.E.
1775
RODIONOVSKAIA, T.F.
2168
RODRIGUEZ ALVAREZ, J.L.
1807
ROGINSKY, M.
2207*
ROHNER, A.
2048
ROLLES, C.J.
1960*
ROMIG, D.A.
2081*
RONSSE, G.
1951
ROOS, C.M.
2144*
ROSALES, S.
1972
ROSALKI
2188
ROSELL, S.
1600
ROSELLO, E.
2023
ROSEN, Y.
1867
ROSENBERG, I.H.
1555*
ROSENBLUM, W.I.
1680*
ROSENFELD, G.C.
1618*
ROSENFIELD, L.
2274
ROSSELIN, G.
1701
ROTHSCHILD, M.A.
1670*
ROTIROTI, D.
2064
ROWLAND, R.
2117
ROY, C.C.
1966*
ROZANOV, I.B.
1865
ROZENFEL'D, E.L.
2116
ROZHKOVA, A.P.
2270
RUBALTELLI, F.F.
2057
RUBIN, S.Z.
1952
RUCHTI, C.
1937
RUDMAN, D.
2213
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1555*
RUEFF, B.
2187*
RUFENER, C.
1635
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1594*
RUSSELL, E.S.
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1721*
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1758
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2311
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2200*
SAMLOFF, I.M.
1888*
SAMSON, E.I.
1912
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1616
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2091*
SANNELLA, J.J.
2134*
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1843*
SANZ, F.
1974
SAPORTA, J.A.
1939
SARGENT, K.S.
1683
SARI, H.
1650
SARLES, H.
2225*
SARNA, S.K.
1595*
SARTI, D.
2222*
SASAJIMA, K.
1843*
SASAKI, R.
1642*
SATERBORG, N.-E.
1809
SATO, T.
2159*
SATOMURA, K.
1938
SAUNDERS, D.R.
1712*
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1746*
SAVAGE, D.C.
1722*
SAWAZAKI, N.
1855
SAYLOR, J.L.
1991
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1616
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1935
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1867
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1726
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1751*
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1694
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2101
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1774
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1774
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1979
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1773
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2184*
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1808
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2217
SCHULZ, T.B.
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2059
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1821
SCHUTT, C.
2059
SCHWABE, A.D.
1776
SCHWARTZ, J.H.
1568*
SCHWILLE, P.O.
1751*
SCLAFANI, S.J.A.
2014
SCORTECCI, V.
2042*
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2243
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1768*
SEAMAN, W.E.
2070*
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1888*
SEGATO, G.
2018
SEGOVIA DE ARANA, J.M.
1677*
SEGURA, J.M.
1791
SEIN, M.M.
2104
SEMB, B.H.K.
1984*
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1798
SEPULVEDA, F.V.
1723*
SERRE, A.
2137
SERROU, B.
2137
SGRO, M.
2112
SHAFFER, H.A., JR.
1823
SHAMES, D.M.
2077*
SHAMLIIAN, A.P.
2228
SHARMA, T.D.
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SHARON, N.
1989
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1846*
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2312
SHEPHERD, A.P.
1749*
SHEREMET'EVA, G.F.
2103
SHERLOCK, S.
2132*
SHERMAN, R.T.
1930
SHIELDS, L.
1612
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1684, 2104
SHIKATA, T.
2143*
SHIMA, K.
1855
SHINOHARA, N.
1705
SHIRAI, T.
1562
SHKUROVSKII, V.T.
2113
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2312
SHOWALTER, J.P.
1656*
SHTEINBERG, V.M.
2008
SHVETSOV, S.K.
1863
SHWACHMAN, H.
1961*
SICARD, G.A.
1942
SICARD, J.L.
2025
SICILIANO, A.
2064
SICOT, C.
2187*
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2187*
SIENIAWSKA, M.
2266
SIGNER, E.
1603
SIGURDSON, E.
2280
SIKORSKA, K.
1903
SILEN, W.
1882
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1731
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SIMAVORIAN, P.S.
2058
SIMMONS, R.L.
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1780
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2145*
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1874
SINGLETON, E.B.
1781
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1892*
SKALA, I.
1630
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1882
SKRIPNICHENKO, D.F.
2230
SKUDE, G.
2043*
SKUIA, N.A.
1787
SLAGLE, G.W.
1993
SLIUSARENKO, E.N.
2172

SLOT, J.W.
1647
SMALL, D.M.
1747*
SMIRNOV, I.V.
2003, 2004
SMITH, C.I.
2139
SMITH, D.
1989
SMITH, E.L.
1728
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SMITH, R.K.
1645
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SMITH, T.F.
1985
SMYTH, J.
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SNIGUR, C.I.
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1730
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2068
SOLANGI, K.
2151*
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SOLITRO, A.
1970
SONG, C.S.
1670*
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2087*
SORENSON, F.M.
1794
SORRELL, M.F.
2154*
SOULE, J.-C.
1752*
SOUTHGATE, D.A.T.
1729
SOYER, M.T.
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2063
SPERANZA, V.
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2286
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2253*, 2255*, 2258*
STAGE (MCMURPHY), D.
1602
STAHL, J.
2101
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1612
STALPORT, J.
1951
STAMM, W.E.
2151*
STANLEY, R.J.
1859, 1991
STAREK, P.J.K.
1838
STASSE, P.
1951
STEELE, B.J.
1847*
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1660*
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2305
STEINER, H.
1751*
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1848*
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2044*
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GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED$_{50}$	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
µg	microgram(s)
Hz	Hertz
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K_m	Michaelis constant
LD$_{50}$	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
µM	micromolar; micromole(s)
ma	milliampere(s)
mCi, µCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)
ml, µl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

2313 THE INFLUENCE OF 400 R X-IRRADIATION ON THE NUMBER AND THE LOCALIZATION OF MATURE AND IMMATURE GOBLET CELLS AND PANETH CELLS IN INTESTINAL CRYPT AND VILLUS. (Eng.) Van Dongen, J. M.; Kooyman, J.; Visser, W. J. (Dept. Cell Biology and Genetics, Erasmus Univ., P.O. Box 1738, Rotterdam, Netherlands). *Cell Tissue Kinet.* 9(1): 65-75; 1976.

The influence of 400 R x-irradiation on the localization and number of mature and immature goblet cells and Paneth cells in Wistar rat duodenal epithelium was studied. At short times after irradiation when the total proliferative activity in the crypts of Lieberkuhn was reduced, the proportion of mature and immature goblet cells was increased; an absolute increase in the number of goblet cells in the crypts was also found. The immature goblet cells were localized in the lower half of the crypt as in control animals, whereas the number of the mature cells increased over the whole crypt length. When the proliferative activity of the crypt cells increased again from 12-48 hr after irradiation, the number of both types of goblet cells decreased. Between 48 and 72 hr, when the whole crypt was involved in proliferation, a second increase of both types of goblet cells was found. However, the localization of the immature goblet cells was no longer restricted to the lower half of the crypt; they also appeared at the higher cell positions. No immature goblet cells were found on the villus, and the changes in the number of mature goblet cells reflected the changes induced by irradiation in the goblet cell population in the crypt. The absolute number and localization of Paneth cells did not change under the experimental conditions.

2314 MORPHOLOGICAL CORRELATES OF FUNCTIONAL ENHANCEMENT OF LIVER MITOCHONDRIA NOURISHED WITH EXCESS PORTAL BLOOD. (Eng.) Takasan, H.; Mizukami, T.; Yamada, T.; Ozawa, K.; Honjo, I. (Kyoto Univ. Sch. Medicine, Shogoin, Kawaramachi, Sakyo-ku, Kyoto, Japan). *Nihon Rynsho Denshi Kenbikyo Gakkai-Shi* 24(4):235-245; 1975.

The changes of hepatic ultrastructure and mitochondrial metabolism induced by excess portal blood supply were studied in rabbits that were subjected to the ligation of a branch of portal vein. In parallel with an enhancement of phosphorylative capacity, mitochondria increased in size and number in the liver lobes nourished with excess portal blood as compared with sham-operated controls. Swollen, rounded, and electron-lucent mitochondria and mitochondrial partitions, clearly associated with inner membrane, were most numerous at 24 hr after portal ligation, and mitochondrial respiratory and phosphorylative capacities were also maximally enhanced at this time. At about 48 hr, when an increase of nuclear DNA synthesis occurred, the number and size of mitochondria returned to the control levels in parallel with decreasing phosphorylative capacity. It is suggested that there is a relation between the degree of enhanced phosphorylative capacity and the increased mitochondrial number and size. It is likely that increases in mitochondrial number and their sizes represent a response to increased energy demands and are caused by the division of mitochondria.

2315 ANALYTICAL SUBCELLULAR FRACTIONATION STUDIES ON RAT LIVER AND ON ISOLATED JEJUNAL ENTEROCYTES WITH SPECIAL REFERENCE TO THE SEPARATION OF LYSOSOMES, PEROXISOMES, AND MITOCHONDRIA. (Eng.) Peters, T. J.; Shio, H. (Royal Postgraduate Medical Sch., Du Cane Road, London W12 OHS, England). *Clin. Sci. Mol. Med.* 50(5): 355-366; 1976.

A method for isolating rat jejunal enterocytes that are relatively uncontaminated by other components is described in Sprague-Dawley rats. In addition, the properties of the subcellular organelles from these enterocytes are compared with those of rat liver. The Reiser-Christiansen technique was modified in that cell dissociation occurred at 25 C, rather than 33 C, and the cells were washed and centrifuged in 0.3 M sucrose containing 1 mM EDTA and 22 mM ethanol. Electron microscopy indicated the preservation of lysosomal integrity. α-Glucosidase, alkaline phosphatase, and leucyl-β-naphthylamidase were considerably more active in the enterocyte than in the liver. Catalase and D-amino acid oxidase activities were considerably higher in liver than in the enterocyte (catalase was 100 times more active in liver than in enterocyte). Cytochrome c oxidase had a higher specific activity in the enterocyte, but malate and lactate dehydrogenases and monamine oxidase were 2 to 3 times more active in the liver. Nine acid hydrolases had different relative activities in the two tissues. Substrate specificities of D-amino acid oxidase from the two tissues were similar, as was the activity of latent N-acetyl-β-glucosaminidase. Attempts to separate the enterocyte subcellular organelles, characterized by their marker enzymes, with isopycnic centrifugation were unsuccessful, but good separation was achieved by sedimentation through a shallow sucrose density gradient with a superimposed inverse gradient of low-molecular-weight dextran. The properties and enzyme activities of the principal subcellular organelles in rat liver cells and enterocytes are compared.

2316 CELL PROLIFERATION KINETICS IN NORMAL HUMAN GASTRIC MUCOSA: STUDIES ON DIURNAL FLUCTUATIONS AND EFFECT OF FOOD INGESTION. (Eng.) Hansen, O. H.; Pedersen, T.; Larsen, J. K. (Bispebjerg Hosp., DK-2400 Copenhagen NV, Denmark). *Gastroenterology* 70(6):1051-1054; 1976.

Ninety-six biopsy specimens of gastric mucosa from three healthy subjects were studied to: (a) estimate the fasting labeling index in the fundic and antral mucosa after *in vitro* incorporation of ^{3}H-thymidine; (b) investigate whether the mucosal cell proliferation kinetics are subject to diurnal variations; and (c) determine the effect of food ingestion on the rate of mucosal cell proliferation. After incubation with ^{3}H-thymidine (20 μCi/ml), autoradiographs were prepared by the dipping technique, and the labeling and mitotic indices in the fundic and antral mucosa were estimated. The number of DNA-synthesizing cells and the mitotic frequencies were higher in antral mucosa compared to mucosa in the fundic stomach ($p<0.01$). Biopsies were taken after 12 hr of fasting and at various intervals during the following day. No diurnal variations in the labeling and mitotic indices were observed. Biopsies were taken at various intervals after ingestion of a protein-rich meal, preceded by 12 hr of fasting. Significant changes in cell proliferation were not found either in antral or in fundic mucosa, indicating that a meal does not affect the rate of cell renewal in human gastric mucosa.

2317 THE DEVELOPMENT OF MICROPEROXISOMES IN THE CELLS OF THE PROXIMAL TUBULES OF THE KIDNEY AND EPITHELIUM OF THE SMALL INTESTINE DURING THE EMBRYONIC DEVELOPMENT AND POSTNATAL PERIOD. (Eng.) Pipan, N.; Psenicnik, M. (Inst. Human Biology, Ljubljana, Yugoslavia, Lipiceva 2). *Histochemistry* 44(1):13-21; 1975.

2318 DEVELOPMENT OF THE SMALL INTESTINE IN THE HYPOPHYSECTOMIZED RAT. I. GROWTH, HISTOLOGY, AND ACTIVITY OF ALKALINE PHOSPHATASE, MALTASE, AND SUCRASE. (Eng.) Yek, K.-Y.; Moog, F. (Dept. Biology, Washington Univ., St. Louis, MO 63130). *Dev. Biol.* 47(1):156-172; 1975.

2319 EFFECT OF DENERVATION ON THE MITOTIC INDEX OF THE INTESTINAL EPITHELIUM OF THE RAT. (Eng.) Musso, F.; Lachat, J.-J.; Cruz, A. R.; Goncalves, R. P. (Universidade Federal do Espirito Santo, Brazil). *Cell Tissue Res.* 163(3):395-402; 1975.

2320 MORPHOLOGICAL STUDIES ON THE SYNTHESIS OF SECRETORY GRANULES IN CONVOLUTED TUBULES OF MOUSE SUBMANDIBULAR GLAND. (Eng.) Kaiho, M.; Nakamura, T.; Kumegawa, M. (Sch. Medicine, Yokohama City Univ., Urafunecko, Yokohama, Japan). *Anat. Rec.* 183(3):405-420; 1975.

2321 CHANGES IN NUMBERS OF ACIDOPHILIC AND BASOPHILIC CONNECTIVE TISSUE GRANULATED CELLS IN THE INTESTINE OF THE RAT DURING THE ESTROUS CYCLE. (Eng.) Johnson, S. M.; Nellor, J. E. (Coll. Osteopathic Medicine, Michigan State Univ., East Lansing, MI 48824). *Anat. Rec.* 183(3):449-458; 1975.

2322 HISTOPATHOLOGICAL EFFECT OF Clostridium perfringens ENTEROTOXIN IN THE RABBIT ILEUM. (Eng.) McDonel, J. L.; Duncan, C. L. (Food Res. Inst. and Dept. Bacteriology, Univ. Wisconsin, Madison, WI 53706). *Infect. Immun.* 12(5):1214-1218; 1975.

See also, 2371, 2392, 2443, 2447, 2472, 2491, 2585.

ABSORPTION - EXCRETION - TRANSPORT

2323 THE INFLUENCE OF VILLOUS COUNTER CURRENT EXCHANGE ON INTESTINAL ABSORPTION. (Eng.) Winne, D. (Pharmakologisches Institut der Universitat, Wilhelmstrasse 56, D-7400 Tubingen, Federal Republic of Germany). *J. Theor. Biol.* 53(1):145-176; 1975.

Equations are derived that describe the influence of a counter current exchange (CCE) in the intestinal villi on intestinal absorption and elimination. CCE retards absorption or elimination, diminishes the rate of absorption or elimination, and builds up a gradient from tip to base during absorption or base to tip during elimination. A decreased villous blood flow, particularly with decreasing linear flow rate, increases the efficiency of CCE, as does increased permeability of the substances. Experimental data in the literature, from studies of the cat, conform to the theoretical predictions, while those from studies of the rabbit and rat small intestine do not demonstrate evidence for CCE. These differences may be due to differing vascular anatomy of the villi of the three species. The vasculature in the cat consists of one arterial limb and several venous limbs connected in a hairpin-like manner. The distance between the arterial and venous limbs (length approximately 1 mm) is 10-20 μm, thus fulfilling the requirements for an extravascular shunt and CCE. The rat villus is leaf-like and the vasculature is frequently trapezoidal. The rabbit villus has a leaf- or tongue-like shape, and the vasculature has a triangular contour.

2324 INTERACTION BETWEEN SUGARS AND AMINO ACIDS IN INTESTINAL ABSORPTION BY RAT, IN VIVO. (Eng.) Bolufer, J.; Larralde, J.; Ponz, F. (Dept. Animal Physiology, Univ. Navarra, Pamplona, Spain). *Experientia* 31(10):1171-1173; 1975.

Mutual interactions among glucose, galactose, and

eucine absorption by the rat small intestine were
tudied *in vivo*. Sugar and amino acid solutions
ere circulated through segments of intestine of
istar rats, and D-[1-^{14}C]galactose, D-[1-^{14}C]glu-
ose, and L-[1-^{14}C]leucine readings were taken in
liquid scintillation counter. When 20 mM leucine
as present, an inhibition of 33% for glucose and
f 28% for galactose absorption were observed. On
losed circuit perfusion with a peristaltic pump,
) mM galactose inhibited the absorption of leucine
t initial concentrations of 20, 4, and 1 mM by 17%,
3%, and 25%, resp. These experiments confirm the
utual interaction between galactose and leucine
n vivo.

325 SOME ASPECTS OF THE INTESTINAL ABSORPTION OF ZINC IN MAN.

(Eng.) Andersson, K. E.;
ratt, L.; Dencker, H.; Lanner, E. (University
osp., S-221 85 Lund, Sweden). *Eur. J. Clin.
harmacol.* 9(5/6):423-428; 1976.

he intestinal absorption of zinc was investigated
y determining the serum zinc concentrations in
eripheral venous blood in eight healthy volunteers
t various times after p.o. administration of 50 mg
n^{++}. The same dose was given to six patients who
ere treated for obesity by jejuno-ileostomy. In
he healthy volunteers, the mean serum zinc concen-
ration was 0.98 μg/ml pre-administration, and a mean
eak concentration of 2.39 μg/ml was found after 3
r. In the patients, the mean serum zinc concentra-
ion was 0.67 μg/ml pre-administration, and a mean
eak concentration of 1.31 μg/ml was found after 90
in. Zinc^{++} (50 mg) was also given to three patients
ho underwent transumbilical catheterization of the
ortal vein for diagnostic purposes; serum zinc con-
concentrations were measured in portal and peripheral
enous blood that were sampled simultaneously. No
ignificant differences were found between the
concentration of zinc in portal and peripheral venous
lood during absorption, suggesting slow passage of
zinc across the intestinal wall. The mechanisms in-
volved in the gastrointestinal absorption of zinc
are still unknown, and active transport has not been
determined.

2326 INTESTINAL CALCIUM ABSORPTION: DIFFERENCES IN TRANSPORT BETWEEN DUODENUM AND ILEUM.

(Eng.) Behar, J.; Kerstein, M. D. (Veterans Admin. Hosp., West Haven, CT 06516). *Am. J. Physiol.* 230(5):1255-1260; 1976.

The *in vivo* interaction of calcium transport with sugar, sodium, and water absorption was studied in intestinal loops of Charles River strain rats fed laboratory chow and in those of vitamin D-deficient and -repleted rats. The vitamin D-deficient animals were fed a vitamin D-free rachitogenic diet for at least 12 weeks before the experiments were performed; then half of these animals were then repleted with 50,000 U of vitamin D$_2$ by i.m. injection 48 and 24 hr before the experiments. Calcium absorption in the duodenum was enhanced by 25 mM D-glucose only in the vitamin D-deficient rats. In both vitamin D-deficient and -repleted ileum, calcium absorption decreased when NaCl was replaced by mannitol; however, it remained unchanged when NaCl was replaced by choline chloride or urea. Calcium absorption was enhanced by actively transported sugars and by increasing net water flow generated by differences in osmotic pressure and urea. Under all experimental conditions there was a strong association between net water and calcium absorption in the ileum. These findings suggest that calcium absorption is enhanced by solvent drag, although the role of sodium cannot be excluded completely.

2327 INTESTINAL CaBP: A NEW QUANTITATIVE INDEX OF VITAMIN D DEFICIENCY IN THE RAT.

(Eng.) Bronner, F.; Freund, T. (Univ. Connecticut Health Center, Farmington, CT 06032). *Am. J. Physiol.* 229(3):689-694; 1975.

The effects of 25-hydroxycalciferol (25-OH-D$_3$) on the plasma calcium level and intestinal calcium-binding protein (CaBP) concentration levels were studied in vitamin D-deficient male Sprague-Dawley rats. The time course of the calcemic response to a single i.p. injection of 25-OH-D$_3$ (15 U) indicated a peak at 24-25 hr. The extent of the calcemic response was dose-related and was a linear function of the dose raised to the power of 2 over the range of 1.5-150 U. The dose response curve for intestinal CaBP was also linearly related to dose over the same range and was a function of dose raised to the power of 2. Dihydrotachysterol was as effective as 25-OH-D$_3$. When vitamin D-deficient rats were fed a high calcium, high phosphorous diet, hypocalcemia was not present, but the intestinal level of CaBP was nil, suggesting that CaBP can be a more reliable index of the vitamin D status of the animal than its plasma calcium level, provided that calcium intake is controlled.

2328 IN VITRO UPTAKE AND METABOLISM OF PTEROYLPOLYGLUTAMATE BY RAT SMALL INTESTINE.

(Eng.) Halsted, C. H.; Reisenauer, A.; Back, C.; Gotterer, G. S. (Dept. Internal Medicine, Univ. California, Davis, CA 95616). *J. Nutr.* 106(4): 485-492; 1976.

The digestion and cellular uptake of ^{14}C-pteroylheptaglutamate (^{14}C-PG-7) was studied using an isolated cell preparation from small intestine Wistar rat and by assay of folate conjugase in whole homogenates and brush border fractions of rat small intestinal mucosa. In the cell preparation, ^{14}C-pteroylmonoglutamate (^{14}C-PG-1), the principal degradation product of ^{14}C-PG-7, was concentrated earlier in the cell fraction than in the extracellular fraction, while the concentrations equalized after 15 min. Incubation of cells with equimolar ^{14}C-PG-7 and ^{3}H-PG-1 was followed by a threefold greater cellular concentration of ^{14}C-PG-1 than ^{3}H-PG-1. In subcellular fractionation studies, folate conjugase was minimally present in the brush border relative to the supernatant fraction. These data suggest that ^{14}C-PG-7 is transported into the epithelial cell of the intestinal mucosa prior to its hydrolysis by intracellular folate conjugase.

2329 THE EFFECT OF ALDOSTERONE AND THE RENIN-ANGIOTENSIN SYSTEM OF SODIUM, POTASSIUM AND CHLORIDE TRANSPORT BY PROXIMAL AND DISTAL RAT COLON IN VIVO. (Eng.) Dolman, D.; Edmonds, C. J. (Clinical Research Centre, Watford Road, Harrow, Middlesex, HA1 3UJ, England). *J. Physiol.* 250(3): 597-611; 1975.

The roles of aldosterone and angiotensin in the direct control of epithelial sodium transport *in vivo* were investigated by measuring electrical potential differences (p.d.) and the fluxes of sodium, potassium, and chloride in Wistar rat colon. Exogenous angiotensin (0.5, 50, or 500 ng/min/kg) and aldosterone (500 ng/min/kg) were administered by both short- and long-term infusions, and endogenous secretion of the hormones was varied by dietary sodium and by nephrectomy and/or adrenalectomy. Angiotensin had no significant action on p.d. or on the ionic fluxes of the proximal or distal colon. The increase in p.d. produced by infusing aldosterone was unaffected by giving angiotensin concurrently. The effect of sodium depletion in stimulating sodium absorption and potassium secretion was completely abolished by adrenalectomy but it was unaffected by nephrectomy. During prolonged infusion of angiotensin into adrenalectomized rats, a small fall in fecal fluid and sodium content was observed, but this change had little significance in sodium homeostasis. Aldosterone and sodium depletion stimulated sodium absorption in both proximal and distal colon, but significant increase in potassium secretion was demonstrable only in the distal colon. Bicarbonate secretion (by calculation) was unaffected. In the proximal colon, the increased sodium absorption was accompanied by increased chloride absorption, while in the distal colon, the sodium-potassium exchange was increased. Adrenalectomy reduced potassium secretion in both proximal and distal colon, but sodium absorption was only significantly reduced in the proximal colon. It is concluded that angiotensin in the living animal does not play a role as an important salt retaining hormone by direct epithelial action. Aldosterone has a considerable effect, which is independent of the presence of angiotensin, and which differs in proximal and distal colon in relation to the relative effects on chloride absorption and potassium secretion.

2330 EFFECT OF ASPIRIN ON NORMAL AND CHOLERA TOXIN-STIMULATED INTESTINAL ELECTROLYTE TRANSPORT. (Eng.) Farris, R. K.; Tapper, E. J.; Powell, D. W.; Morris, S. M. (Univ. North Carolina Sch. Medicine, Chapel Hill, NC 27514). *J. Clin. Invest.* 57(4):916-924; 1976.

The effect of aspirin on normal and cholera toxin-stimulated electrolyte transport was investigated *in vitro*. In the Ussing chamber, 10 mM aspirin decreased control rabbit ileal potential difference and short-circuit current by 50% and increased conductance by 28%. Bidirectional electrolyte flux determinations indicated that aspirin significantly increased both Na and Cl absorption and reduced the residual flux (which probably represents HCO_3 secretion) to zero. α-Adrenergic blockers did not prevent the electrical effects of aspirin, suggesting that aspirin does not exert its effect through releas of tissue stores of catecholamines. In the presence of aspirin, cholera toxin increased the potential difference and short-circuit current, and decreased the conductance of rabbit ileum (qualitatively similar to control tissues). However, aspirin reversed cholera toxin-stimulated Na transport from secretion to absorption, inhibited cholera toxin, induced Cl secretion by 58%, and partially, but not significantly, inhibited HCO_3 secretion. Thus, the inhibitory effect of aspirin on cholera toxin-induced electrolyte secretion appears to be due to aspirin-stimulated Na and Cl absorption. Although aspirin reduced tissue cyclic AMP concentrations in normal and cholera toxin-stimulated ileum, it also inhibited the electrolyte secretion induced by exogenous cyclic AMP. Thus, if aspirin's stimulatory effect on sodium and anion absorption in normal tissue and its inhibitory effect on cholera toxin-stimulated sodium and anion secretion involves a cyclic AMP-mediated system the effect must be at a step distal to cyclic AMP production or degradation.

2331 THE EFFECT OF SECRETIN ON HYDROGEN ION TRANSPORT IN THE DUODENUM AND JEJUNUM. (Eng.) Chung, R. S.; Johnson, G. M.; Denbesten, L. (Veterans Admin. Hosp., Iowa City, IA 52242). *J. Surg. Res.* 20(5):467-471; 1976.

The capacity of the upper small intestine to dispose of acid in the absence of bile and pancreatic juice was measured in a group of five cats. *In vivo* titrations were performed in cat upper duodenum, lower duodenum, and jejunum to various pH levels in a reci culating perfusion circuit. The effect of secretin in this capacity to dispose of acid was investigated by repeating the experiment with i.v. infusion of GI secretin at 3 Clinical U/kg/hr. Identical results were obtained in the lower duodenum and jejunum, but a significant increase in rate of H^+ removal occurred in the upper duodenum at all pH levels (2.0-6.0). Histological examination showed that the Brunner's glands did not extend for more than half the length of upper duodenum, and were not found in either the lower duodenum or jejunum. No morphological changes, other than depletion of mucin in Brunner's glands, were detected in animals that were stimulated with secretin. It is concluded that secretin's only effect on H^+ transport in the upper small intestine is to increase alkaline secretion from Brunner's glands, for example, resulting in a larger amount of neutralization.

2332 NUTRITIONAL CONSEQUENCES OF THE MAILLARD REACTION. THE ABSORPTION OF FRUCTOSE-L-TRYPTOPHAN IN THE LARGE INTESTINE OF THE RAT. (Eng. Tanaka, M.; Lee, T.-C.; Chichester, C. O. (Dept. Food and Resource Chemistry, Univ. Rhode Island, Kingston, RI 02881). *J. Nutr.* 105(8):989-994; 1975.

2333 CALCULATION OF THE GASTRIC ABSORPTION RATE CONSTANTS OF 5-SUBSTITUTED BARBITURATES THROUGH THE R_m VALUES OR SUBSTITUENT ΔR_m CONSTANTS IN REVERSED-PHASE PARTITION CHROMATOGRAPHY. (Eng.)

Pla-Delfina, J. M.; Moreno, J.; Duran, J.; del Pozo, A. (Faculty of Pharmacy, Univ. Barcelona, Barcelona, Spain). *J. Pharmacokinet. Biopharm.* 3(2):115-141; 1975.

2334 METABOLISM OF DRUGS. LXXXVI. THE METABOLIC FATE OF NITROFURAN DERIVATIVES. (4). THE PORTAL ABSORPTION OF NITROFURAN DERIVATIVES AND THE ABSORPTION RATE AS A FUNCTION OF AGE IN RATS. (Eng.) Tatsumi, K.; Yamaguchi, T.; Yoshimura, H. (Faculty Pharmaceutical Sciences, Kyushu Univ., Maidashi, Fukuoka, Japan). *Chem. Pharm. Bull. (Tokyo)* 23(7):1555-1560; 1975.

2335 IRON BALANCE AND ABSORPTION. (Eng.) Jacobs, A. (Univ. Hosp. Wales, Heath Park, Cardiff CF4 4XN, Wales). *Bibl. Nutr. Dieta* (22):61-73; 1975.

2336 VITAMIN ABSORPTION (EXCLUDING VITAMIN A). (Eng.) Morava, E.; Tarjan, R. (Institut fur Ernahrungswissenschaft, Gyali ut 3/a, Budapest IX, Hungary). *Bibl. Nutr. Dieta* (22):86-100; 1975.

2337 CARBOHYDRATE ABSORPTION. STUDIES ON THE GLUCOSE TRANSPORT BY ISOLATED BRUSH BORDER MEMBRANES. A CONTRIBUTION TOWARDS AN UNDERSTANDING OF THE MOLECULAR MECHANISM OF SUGAR ABSORPTION. (Eng.) Hopfer, U. (Eidgenossische Technische Hochschule Zurich, Universitatstrasse 16, CH-8006, Zurich, Switzerland). *Bilb. Nutr. Dieta* (22):42-49; 1975.

2338 PROTEIN ABSORPTION. (Eng.) Matthews, D. M. (Westminster Hosp., 124 Vauxhall Bridge Road, London SW1V 2 RH, England). *Bilb. Nutr. Dieta* (22):28-41; 1975.

2339 ELECTRO-POTENTIAL DIFFERENCES IN THE GASTROINTESTINAL TRACT. PRESENT STATUS. (Eng.) Wingate, D. L. (London Hosp. Medical Coll., Turner St., London E1 2AD, England). *Acta Hepatogastroenterol. (Stuttg)* 22(3):200-205; 1975.

2340 THE EFFECT OF DODECYLSULPHATE UPON NET SODIUM AND WATER TRANSPORT FROM TIED JEJUNAL LOOPS IN ANAESTHETIZED RATS. (Eng.) Sund, R. B. (Dept. Pharmacol., Inst. Pharm., Univ. Oslo, (Oslo, Norway). *Acta Pharmacol. Toxicol. (Kbh.)* 37(4):282-296; 1975.

2341 TRANSMUCOSAL FLUID MOVEMENT AND ITS EFFECT ON DRUG ABSORPTION. (Eng.) Kitazawa, S.; Ito, H.; Sezaki, H. (Kyoto Univ. Hosp., Kawara-cho Shogoin, Sakyo-ku, Kyoto, Japan). *Chem. Pharm. Bull. (Tokyo)* 23(8):1856-1865; 1975.

2342 A STUDY OF ABSORPTION OF COMPOUNDS FROM THE RAT BILIARY TREE BY RETROGRADE INTRABILIARY INJECTION (RII). (Eng.) Peterson, R. E.; Fujimoto, J. M. (Medical Coll. Wisconsin, Milwaukee, WI). *J. Pharmacol. Exp. Ther.* 194(1):126-134; 1975.

2343 HYPEROSMOTIC INSTILLATION OF RAT STOMACH. (Eng.) Sernka, T. J.; Jackson, A. F. (Louisiana State Univ. Medical Center, Shreveport, LA 71130). *Life Sci.* 17(3):435-442; 1975.

2344 THE MECHANISM OF THE HALOTHANE-DEPENDENT EFFLUX OF CALCIUM FROM RAT-LIVER MITOCHONDRIA. (Eng.) Grist, E. M.; Baum, H. (Dept. Biochemistry, Chelsea Coll., Manresa Road, London, England SW3 6LX). *Eur. J. Biochem.* 57(2):621-626; 1975.

2345 THE ACUTE EFFECT OF SODIUM CELLULOSE PHOSPHATE ON INTESTINAL ABSORPTION AND URINARY EXCRETION OF CALCIUM IN MAN. (Eng.) Berstad, A.; Jorgensen, H.; Frey, H.; Vogt, J. H. (Aker Hosp., Oslo, Norway). *Acta Med. Scand.* 197(5):361-365; 1975.

2346 CRITICAL STUDY OF METHODS UTILIZED TO CALCULATE MAXIMAL BILIARY TRANSPORT OF BSP IN MAN. (Fre.) Loridan, P.; Dupuy, M.; Charbonnier, A.; Nepveux, P.; Fluteau, G.; Fluteau, D. (Salpetriere, Paris, France). *Ann. Gastroenterol. Hepatol.* 11(4):313-321; 1975.

2347 EFFECT OF LUMISTEROL-3 ON THE CALCIUM ABSORPTION IN THE GUT AND ON THE CALCIFICATION OF BONE TISSUE [Abstract]. (Eng.) Goveseyeva, N. N. (No affiliation given). *Sci. Tech. Aerosp. Rep.* 13(17):2157; 1975.

See also, 2467, 2475, 2492, 2496, 3002.

2348 THE VAGAL CONTROL OF THE ILEO-CECAL SPHINCTER IN THE CAT. (Eng.) Pahlin, P. E.; Kewenter, J. (Sahlgrenska Sjukhuset, Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 96(4): 433-442; 1976.

The effect of efferent cervical vagal stimulation on a flow through the ileo-cecal sphincter (ICS) was studied in 53 cats which were anesthetized with chloralose. The motor activity of the jejunum, ileum, and large intestine adjacent to the sphincter were recorded simultaneously. Vagal stimulation caused a decrease in the transsphincteric flow and increased motor activity in the ileum. Increased motor activity in the proximal colon was recorded only occasionally. When the vagal nerves were stimulated during continuous splanchnic stimulation, the transsphincteric flow was decreased although the tone and motility of the ileum were suppressed. Guanethidine (1-3 mg/kg) blocked or suppressed the effect of vagal stimulation on the transsphincteric flow, while the excitatory response of the proximal colon was greatly enhanced. This indicates that the reduction of the transsphincteric flow following vagal stimulation was at least partly due to a direct effect of the vagal nerves on the sphincteric muscle and not to a squeezing effect of that part of the colonic wall that surrounds the sphincter. Atropine (0.1 and 1 mg/kg) blocked all responses to vagal stimulation. Thus, both guanethidine and atropine blocked the vagally induced contraction of the ICS. Relaxation of the ICS was never obtained by vagal stimulation, even when the tone of the sphincter was increased by infusion of noradrenaline.

2349 HISTAMINE RECEPTORS IN ESOPHAGEAL SMOOTH MUSCLE OF THE OPOSSUM. (Eng.) DeCarle, D. J.; Brody, M. J.; Christensen, J. (Univ. Hosps. Iowa City, IA 52242). *Gastroenterology* 70(6):1071-1075; 1976.

Esophageal smooth muscle of the opossum was examined for histamine H_1 and H_2 receptors. The effects of histamine, 4-methylhistamine (4-MH), and 2-(2-pyridyl) ethylamine (PEA), mepyramine and metiamide, and the histamine-releasing substance compound 48/80 on lower esophageal sphincter (LES) and esophageal body (EB) smooth muscle were studied in a superfused tissue bath. Histamine, PEA (an H_1 receptor agonist), and compound 48/80 caused a dose-related increase in LES basal tension and in EB off response amplitude, the threshold for histamine being 6.7×10^{-8} M and for PEA being 6.7×10^{-7} M. In the presence of mepyramine (an H_1 receptor antagonist), the effects of histamine and compound 48/80 were reversed to inhibition of both LES basal tension and EB off response amplitude, while the effect of PEA was abolished. Metiamide (an H_2 receptor antagonist) did not alter responses to histamine, PEA, or compound 48/80. 4-Methylhistamine (an H_2 receptor agonist) caused a reduction in LES tension and EB off response amplitude, but it caused an increase in those parameters in the presence of metiamide. A combination of mepyramine and metiamide abolished responses to all agonist drugs. The results indicate that LES and EB smooth muscle contain both excitatory H_1 and inhibitory H_2 receptors for histamine. Endogenous histamine released from storage sites in LES and EB and exogenous histamine both preferentially activate H_1 receptors.

2350 GALLBLADDER PRESSURE-VOLUME RESPONSE TO GASTROINTESTINAL HORMONES. (Eng.) Ryan, J.; Cohen, S. (Temple Univ. Sch. Medicine, Philadelphia, PA 19140). *Am. J. Physiol.* 230(6):1461-1465; 1976.

The pressure-volume (PV) response of the opossum gallbladder was studied under basal conditions and after the continuous i.v. infusion of gastrin I, secretin, and cholecystokinin (CCK). The hormone effects were examined individually and in combination. The unstimulated gallbladder was capable of accommodating increases in intraluminal volume with only slight changes in intraluminal pressure. CCK (0.025, 0.25, and 2.5 μg/kg/hr) significantly increased the pressure recorded from the gallbladder ($p<0.01$). The pressure depended upon the concentration of CCK and the intraluminal volume. Gastrin I (0.25 and 0.50 μg/kg/hr) had no independent effect on the PV response of the gallbladder but it reduced the stimulatory effect of CCK. Secretin (0.25 U/kg/hr) alone decreased the PV response of the gallbladder. Secretin also antagonized the stimulatory response to CCK. These findings suggest that the regulation of gallbladder motor function and pressure generation, exclusive of neural input, may depend upon the interaction of CCK with gastrin and secretin and the intraluminal volume of the organ at the time of stimulation.

2351 INTESTINAL MYOELECTRIC ACTIVITY IN RESPONSE TO LIVE *Vibrio cholerae* AND CHOLERA ENTEROTOXIN. (Eng.) Mathias, J. R.; Carlson, G. M.; DiMarino, A. J.; Bertiger, G.; Morton, H. E.; Cohen, S. (Veterans Admin. Hosp., Gainesville, FL). *J. Clin. Invest.* 58(1):91-96; 1976.

The myoelectric response in the ileum of New Zealand white rabbits was studied in response to live *Vibrio cholerae* culture, a whole cell lysate of cholera, and to the purified enterotoxin. Each cholera preparation produced a series of highly organized migrating action potential complexes (MAPC). An MAPC was defined as action potential discharge with a duration of 2.5 sec or longer, followed by similar activity on at least one other consecutive electrode site. The mean and modal onset time of MAPC activity occurred 4 hr after the infection with live *Vibrio cholerae* culture, the freeze-dried whole cell lysate preparation, or the purified enterotoxin. After the onset of activity this pattern persisted for the duration of the recording period (up to 12 hr). The MAPC had a mean propagation velocity of 0.85 cm/sec, which remained constant with time. Direct visual observation of the loop revealed that the MAPC's resulted in contractions that propelled intraluminal contents in an aborad direction. The mean fluid output from the 12-cm ileal loops was 6.4 ml/hr. Control experiments consisted of recordings from: a ligated ileal loop into which nothing was placed; a ligated ileal loop into which either uninfected culture broth or 0.9% NaCl solution was injected; a ligated ileal loop infused with 0.9% NaCl solution at a rate of 11.2 ml/hr; and rapid injection of 1.0, 2.5, 5.0, or 10.0-ml boluses of 0.9% NaCl into the proximal catheter. MAPC activity was not observed in any of the control experiments. These studies indicate that in addition to a secretory component to cholera, there exists a highly organized MAPC that results in contractions that propel intraluminal contents in an aborad direction.

2352 EFFECTS OF 5-HYDROXYTRYPTAMINE AND MORPHINE ON THE STOMACH MOTILITY IN SITU. (Eng.) Terawaki, Y.; Takayanagi, I.; Takagi, K. (Faculty Pharmaceutical Sciences, Univ. Tokyo, Bunkyo-ku, Tokyo 113, Japan). *Jpn. J. Pharmacol.* 26(1):7-12; 1976.

The effect of 5-hydroxytryptamine and morphine on the stomach movement of both unanesthetized and anesthetized animals (female cats, male rabbits, and male guinea pigs) was investigated *in situ*. In unanesthetized rabbits, 5-hydroxytryptamine (200 µg/kg) caused an initial rapid contraction, while morphine (200 µg/kg) caused depression of spontaneous movement, which was not modified by phentolamine (5 mg/kg) and propranolol (2 mg/kg). Pretreatment with phentolamine (5 mg/kg) and propranolol (2 mg/kg) completely reversed the inhibition of movement produced by adrenalin (10 µg/kg) but only partially reversed the inhibition by 5-hydroxytryptamine (200 µg/kg). In anesthetized rabbits, after the abolition of movement due to pentobarbital (30 mg/kg), 5-hydroxytryptamine (200 mg/kg) induced contraction, followed by inhibition of movement. Morphine (200 µg/kg) had no effect. In unanesthetized guinea pigs, 5-hydroxytryptamine (100 µg/kg) produced a large contraction in amplitude. Pretreatment with atropine (1 mg/kg) depressed contractions produced by both 5-hydroxytryptamine (100 µg/kg) and by acetylcholine (200 µg/kg). In anesthetized guinea pigs, pentobarbital (20 mg/kg) enhanced stomach motility, followed by a gradual inhibition. 5-Hydroxytryptamine (100 µg/kg) produced contraction, while no effect was seen with morphine (100 µg/kg). Atropine (1 mg/kg) inhibited both responses to acetylcholine (200 µg/kg) and to 5-hydroxytryptamine (100 µg/kg). In unanesthetized cats, 5-hyroxytryptamine (200 µg/kg) and morphine (200 µg/kg) inhibited stomach motility. In anesthetized cats, pentobarbital (30 mg/kg) depressed spontaneous motility, while 5-hydroxytryptamine and morphine (200 µg/kg) produced slight contractions. It is concluded that the differences in the modes of action of 5-hydroxytryptamine and morphine on gastric motility are related to differences in both species and experimental conditions, i.e. anesthesia.

2353 ELECTRICAL VAGAL-INDUCED GASTRIC ANTRAL CONTRACTIONS AND GASTRIC EMPTYING OF A LIQUID TEST MEAL IN ANAESTHETIZED CATS. (Eng.) Brooks, F. P.; Carr, D. H. (Dept. Physiology, Univ. Edinburgh, Edinburgh EH9 1QH, Scotland). *J. Physiol.* 251(1):14P-15P; 1975.

2354 EFFECTS OF PROSTAGLANDINS $F_{2\alpha}$ AND E_1 ON THE LONGITUDINAL AND CIRCULAR SMOOTH MUSCLE OF THE GUINEA PIG CAECUM IN RELATION TO THE CONCENTRATION OF EXTRACELLULAR CALCIUM. (Eng.) Kadlec, O.; Radomirov, R. (Inst. Pharmacology, Czechoslavak Academy of Sciences, Prague 2, Albertov 4, 12800 Czechoslavakia). *Naunyn Schmiedebergs Arch. Pharmacol.* 288(4):335-343; 1975.

2355 RELATION BETWEEN GUT MOTILITY AND INNERVATION IN MAN. (Eng.) Bennett, A. (King's Coll. Hosp. Medical Sch., London, SE5 8RX, England). *Digestion* 11(5-6):392-396; 1975.

2356 EFFECTS OF ELEVATED MAGNESIUM ON DISCHARGE OF MYENTERIC NEURONS OF CAT SMALL BOWEL. (Eng.) Wood, J. D. (Univ. Kansas Medical Center, Kansas City, KS 66103). *Am. J. Physiol.* 229(3):657-662; 1975.

2357 A STUDY OF THE ACTIONS OF METHAMPYRONE AND OF A COMMERCIAL INTESTINAL EXTRACT PREPARATION ON INTESTINAL MOTILITY. (Eng.) Gray, G. W.; Yano, B. L. (Coll. Veterinary Medicine, Univ. Minnesota, St. Paul, MN 55101). *Am. J. Vet. Res.* 36(2):201-208; 1975.

2358 A FUNCTIONAL DESCRIPTION OF THE CANINE CHOLEDOCHODUODENAL FLUTTER VALVE. (Eng.) Tansy, M. F.; Innes, D. L.; Martin, J. S.; Kendall, F. M. (Dept. Physiology Biophysics, Temple Univ., 3223 N. Broad St., Philadelphia, PA 19140). *Am. J. Dig. Dis.* 21(3):233-241; 1976.

2359 INFLUENCE OF ENTERAL OXYGEN ADMINISTRATION ON THE SLOW ELECTRICAL ACTIVITY OF THE INTESTINE AND STOMACH. (Eng.) Gelman, S.; Paz, M.; Levy, E. (Cleveland Metropolitan General Hosp., 3395 Scranton Rd., Cleveland, OH 44109). *Arch. Surg.* 111(5):566-574; 1976.

2360 EFFECT OF A FIXED PYLORIC OPENING ON THE GASTRIC EMPTYING IN THE CAT AND DOG. (Eng.) Stemper, T. J.; Cooke, A. R. (VA Hosp., Iowa City, IA 52240). *Am. J. Physiol.* 230(3):813-817; 1976.

2361 THE EUPEPTIDE SYSTEM: A GENERAL THEORY OF GASTROINTESTINAL HORMONES. (Eng.) Wingate, D. (London Hosp. Medical Coll., London E1 2AD, England). *Lancet* 1(7958):529-532; 1976.

MOTILITY

2362 GASTRIC CONTROL OF DUODENAL ELECTRIC ACTIVITY-THE FUNCTION OF THE GASTRODUODENAL JUNCTION. (Eng.) Urso, S. A.; Fileccia, R.; Montalbano, M. E. (Instituto di Fisiologia Generale 129, Corso Tukory, 90134 Palermo, Italia). *Arch. Int. Physiol. Biochim.* 83(5):827-235; 1975.

See also, 2591, 2621, 2685.

SECRETION AND METABOLISM

2363 CHARACTERISTICS OF INTESTINAL PHASE OF GASTRIC SECRETION. (Eng.) Konturek, S. J.; Kaess, H.; Kwiecien, N.; Radecki, T.; Dorner, M.; Teckentrupp, U. (Inst. Physiology, Medical Academy, Krakow, Poland). *Am. J. Physiol.* 230(2):335-340; 1976.

The magnitude of gastric secretion and gastrin release in the intestinal phase, and the effect of the changes of pH of meal on this phase were examined in four dogs, which were provided with special gastroduodenal fistulas, allowing for the complete separation of stomach and duodenum without interrupting the vagal connections between them. In addition, the interaction of pentagastrin with the intestinal phase was studied. A liver extract (LE) meal, confined to the stomach and maintained at pH 5.0 by an intragastric titration technique, produced acid output reaching 66% of the maximal response to histamine (MRH). Perfusion of the LE meal into the duodenum resulted in acid secretion amounting to 57% of MRH. The combination of the gastric and intestinal phases caused the highest acid output, which was about 90% of MRH. Gastric and intestinal phases induced separately were accompanied by a significant elevation in serum gastrin concentrations, which reached the highest values when both phases were evoked simultaneously. Acidification of the intestinal meal resulted in pH-dependent inhibition of gastric secretion falling to the basal values at pH 1.0. These secretory changes were mimicked by exogenous secretin (graded doses doubling every 45 min from 0.5-8.0 U/hg/hr, i.v.). Serum gastrin levels remained essentially unaffected by the acidification of the intestinal meal, while exogenous secretin significantly lowered them. It is concluded that a peptone meal in the intestine is capable of evoking a potent gastric acid and pepsin stimulation by a mechanism involving the release of antral hormone in the intact stomach with undisturbed nervous connections between the stomach and duodenum.

2364 AFTER VAGOTOMY ATROPINE SUPPRESSES GASTRIN RELEASE BY FOOD. (Eng.) Debas, H. T.; Walsh, J. H.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *Gastroenterology* 70(6):1082-1084; 1976.

Changes in serum gastrin in response to feeding a meal of beef liver (15 g/kg) were measured by radioimmunoassay in five gastric fistula dogs with and without administration of atropine sulfate (0.2 mg/kg, i.v.). The studies were repeated after a truncal vagotomy that abolished acid secretion in response to 2-deoxyglucose (2-DG, 100 mg/kg/hr). Before vagotomy, atropine had little effect on the gastrin response to a meal ($p<0.05$). Vagotomy caused an increase in fasting mean serum gastrin (45 ± 5 pg/ml prevagotomy and 74 ± 5 pg/ml postvagotomy). Vagotom significantly increased ($p<0.01$) the serum gastrin response to a meal. The mean rise during the first 2.5 hr after eating was 17 ± 2 pg/ml prevagotomy and 67 ± 6 pg/ml postvagotomy. After vagotomy, atropine significantly suppressed ($p<0.01$) but did not abolish the serum gastrin response to a meal. It is concluded that vagotomy enhances the serum gastrin response to feeding and that atropine counteracts this response.

2365 HISTAMINE RELEASE BY EXOCYTOSIS FROM RAT MAST CELLS ON REDUCTION OF EXTRACELLULAR SODIUM: A SECRETORY RESPONSE INHIBITED BY CALCIUM, STRONTIUM, BARIUM, OR MAGNESIUM. (Eng.) Cochrane, D. E.; Douglas, W. W. (Yale Univ. Sch. Medicine, New Haven, CT 06510). *J. Physiol.* 257(2):433-448, plate 1; 1976.

2366 GUINEA PIG INTESTINAL IRON BINDING PROTEIN. (Eng.) Pollack, S.; Lasky, F. D. (Albert Einstein Coll. Medicine, Bronx, NY 10461). *Biochem. Biophys. Res. Commun.* 70(2):533-539; 1976.

2367 MOTOR AND SECRETORY EFFECTS OF NERVES ON THE PAROTID GLAND OF THE RAT. (Eng.) Thulin, A. (Inst. Physiology, Univ. Lund, Lund, Sweden). *Acta Physiol. Scand.* 96(4):506-511; 1976.

2368 COMPARISON BETWEEN SUCROSE AND LACTULOSE IN A SUSPENDED SALIVARY SYSTEM. (Eng.) Makinen, K. K.; Rekola, M. (Inst. Dentistry, Univ. Turku, Turku, Finland). *J. Dent. Res.* 54(6):1244; 1975.

2369 DIFFERENTIAL PATTERN OF DEVELOPMENTAL CHANGES OF Na^+-STIMULATED AND NONSTIMULATED ALKALINE PHOSPHATASE ACTIVITIES IN A MICROSOMAL FRACTION OF RAT SUBMANDIBULAR GLAND. (Eng.) Son, Y.; Miyagawa, T.; Miyasato, Y.; Takiguchi, H. (Dept. Biochemistry, Nihon Univ., Chiba, Japan). *J. Dent. Res.* 54(5):1100; 1975.

2370 REPRESSION OF DIMETHYLNITROSAMINE-DEMETHYLASE BY TYPICAL INDUCERS OF MICROSOMAL MIXED-FUNCTION OXIDASES. (Eng.) Arcos, J. C.; Bryant, G. M.; Venkatesan, N.; Argus, M. F. (U.S. Public Health Service Hosp., 210 State St., New Orleans, LA 70118). *Biochem. Pharmacol.* 24(16):1544-1547; 1975.

2371 EXOCYTOSIS COUPLES TO ENDOCYTOSIS OF FERRITIN IN PAROTID ACINAR CELLS FROM ISOPRENALIN STIMULATED RATS. (Eng.) Kalina, M.; Robinovitch, R. (Sackler Sch. Medicine, Tel Aviv Univ., Ramat Aviv, Israel). *Cell Tissue Res.* 163(3):373-382; 1975.

2372 CONTINUOUS IN VITRO MEASUREMENT OF MOUSE SALIVARY GLAND ENZYMES. (Eng.) Schuster, G. S.; Pashley, D. H.; Palmer, M. P.; Sharawy, M. M. (Medical Coll. Georgia, Augusta, GA 30902). *J. Dent. Res.* 54(6):1138-1142; 1975.

2373 FLUORIDE IN DOG PAROTID SALIVA AFTER INTRAVENOUS ADMINISTRATION OF SODIUM FLUORIDE, SODIUM MONOFLUOROPHOSPHATE, AND CALCIUM FLUORIDE. (Eng.) Feller, R. P.; Shannon, I. L. (Veterans Admin. Hosp., Lyons, NJ). *J. Dent. Res.* 54(6):1213-1215; 1975.

See also, 2320, 2361, 2624.

SECRETION AND METABOLISM

Stomach

2374 EFFECTS OF ASPIRIN ON GASTRIC PROSTAGLANDIN E (PGE) AND ACID OUTPUT IN NORMAL SUBJECTS. (Eng.) Child, C.; Jubiz, W.; Moore, J. G. (Veterans Admin. Hosp., Salt Lake City, UT). *Gut* 17(1):54-57; 1976.

The effects of aspirin on gastric prostaglandin E (PGE) and acid secretion were studied in eight normal men after a 12- or 16-hr fast. Subjects received 3.3 g of aspirin (1.1 g/8 hr) on 5 consecutive days; the last p.o. aspirin dose was given 8 hr before the collection of gastric juice, and rectal suppositories containing 1.3 g aspirin were given every 4 hr during the 24 consecutive hr in which gastric juice was collected. After aspirin administration, a statistically significant reduction in PGE output (concentration and volume) was observed in comparison with controls. At serum salicylate concentrations of 20-30 mg/dl, which were maintained throughout the study, the circadian rhythm in PGE output was abolished; a significantly increased sensitivity ($p<0.05$) of the PGE system to inhibition by aspirin was observed at 11 PM, 12 PM, and 1 AM. The reduction in prostaglandin output suggests that aspirin inhibits prostaglandin sysnthesis, presumably by inhibiting the enzyme prostaglandin synthetase that is believed to be present in the stomach fundus.

2375 IMMEDIATE SHORT-TIME EFFECTS OF ETHACRYNIC ACID ON FROG GASTRIC MUCOSA IN CHLORIDE-FREE SOLUTIONS. (Eng.) Schwartz, M.; Holloman, T. L.; Dinno, M. A.; Carrasquer, G. (Dept. Physics, Univ. Louisville, Louisville, KY 40208). *Proc. Soc. Exp. Biol. Med.* 151(3):523-525; 1976.

The *in vitro* effect of ethacrynic acid on the K^+ pathway of the gastric mucosa in the absence of Cl^- was studied in *Rana pipiens*. Two pairs of electrodes were used, one for sending current across the mucosa and the other for measuring the transmucosal potential difference (PD). In Cl^--free preparations, the nutrient bathing solution contained, in mM,: Na^+, 101; K^+, 4; Ca^{2+}, 1; Mg^{2+}, 0.8; SO_4^{2-}, 41.3; HCO_3^-, 25; phosphate, 1; glucose, 10; and sucrose, 40. The secretory solution contained: Na^+, 100; SO_4^{2-}, 50; and sucrose, 100; the pH of this solution was maintained at 4.90. The addition of 1 mM ethacrynic acid to the nutrient solution led to a decrease in resistance, which was accompanied by a small increase in PD. Soon after, the resistance started to increase again and the PD decreased. Washing both sides of the mucosa with sulfate solutions without ethacrynic acid restored the parameters to near control values. These results strongly suggest that the dominant effect of ethacrynic acid is not on the Na^+ pathway of the nutrient membrane; however, without knowledge of the relative resistances of the frog gastric mucosa in SO_4^{2-} media, it cannot be inferred whether ethacrynic acid affects predominantly the SO_4^{2-} or the K^+ pathway.

2376 HISTAMINE METABOLISM OF THE GUINEA-PIG GASTRIC MUCOSA. (Eng.) Bergmark, J.; Granerus, G.; Henningsson, S.; Lundell, L.; Rosengren, E. (Inst. Physiology, Univ. Lund, Sweden). *J. Physiol. (London)* 257(2):419-431; 1976.

The mobilization of gastric mucosal histamine as reflected by changes in formation and content was studied in guinea pigs while fasting, and in response to food, pentagastrin, or 2-deoxy-D-glucose. Refeeding fasting guinea pigs as well as s.c. injections of pentagastrin or 2-deoxy-D-glucose (both 200 μg/kg) raised the rate of mucosal histamine formation; pentagastrin induced a fourfold rise. Some properties of the enzyme catalyzing the formation of histamine were examined. The results indicate that this enzyme is histidine decarboxylase, L-histidine carboxylyase. Imidazole-*N*-methyl transferase, which carries out methylation of the imidazole ring to yield 1-methyl-4-(β-aminoethyl)imidazole (methylhistamine), was found in high amounts in the mucosa. The enzyme did not change upon stimulation of the mucosa. In addition, the catabolism of histamine during diamine oxidase blockade was studied concomitantly by two different procedures to investigate the formation of the side-chain methylated compounds. The amount of $[^{14}C]$methylhistamine formed from added $[^{14}C]$histamine was approximately the same as that detemined by estimating the loss of $[^{14}C]$-histamine in aliquot samples of the guinea pig gastric mucosa. These results indicate that there is no *in vitro* formation of ^{14}C-*N*-methyl and *N*-dimethylhistamine. The authors conclude that histamine is formed in the guinea pig gastric mucosa through decarboxylation of histidine by the action of a specific histidine decarboxylase and that histamine mobilization is accomplished primarily by an accelerated synthesis of the amine and not, in addition, by an increased release of preformed histamine.

2377 HISTAMINE EFFECTS ON H^+ PERMEABILITY BY ISOLATED GASTRIC MUCOSA. (Eng.) Fromm, D.; Silen, M.; Robertson, R. (Beth Israel Hosp., 330 Brookline Ave., Boston, MA 02215). *Gastroenterology* 70(6):1076-1081; 1976.

Steady state rates of acid secretion, measured at pH 7, and luminal acid loss, measured at pH 4, were determined by a pH stat technique. The electrical resistance of the tissues was determined by measuring the transmural electrical potential difference response to a pulse of current. The effects of histamine on mucosal permeability to acid were studied in isolated rabbit stomach. Histamine (9×10^{-5} M) decreased antral luminal acid loss, which could not be accounted for by active H^+ secretion or appearance of organic acid. Histamine also increased antral electrical resistance and decreased the unidirectional luminal to serosal flux (J^{ls}) of ^{14}C-erythritol. Histamine, theophylline (1.3×10^{-3} M), and N^6, O^2-dibutyryl adenosine 3',5'-monophosphate (1×10^{-2} M) did not significantly alter secretion by fundus in the presence of salicylate (5×10^{-3} M). However, after removal of salicylate, these agents stimulated acid secretion. Histamine decreased luminal acid loss by both antrum and fundus treated with salicylate, increased the electrical resistance of these tissues, and decreased J^{ls} erythritol of fundic mucosa. Burimamide (1×10^{-3} M) inhibited the permeability effects of histamine on antrum and fundus. The data indicate that histamine decreases spontaneous antral mucosal permeability as well as salicylate-induced increase in mucosal permeability of both antrum and fundus. The effects of burimamide suggest that the antrum contains H_2 receptor sites, which are unrelated to acid secretion and that the fundus contains H_2 receptor sites, which also govern permeability but are independent of those related to acid secretion.

2378 A STUDY OF THE VASCULAR AND ACID SECRETORY RESPONSES OF THE RAT GASTRIC MUCOSA TO HISTAMINE. (Eng.) Main, I. H. M.; Whittle, B. J. R. (Sch. Pharmacy, 29/39 Brunswick Square, London WC1N 1AX, England). *J. Physiol.* 257(2):407-418; 1976.

The effects of histamine on gastric mucosal blood flow, in the presence and absence of gastric acid secretion, were studied in the rat. The i.v. infusion of histamine (50 μ/kg/min) increased gastric acid secretion and mucosal blood flow until steady plateau levels were reached. Increasing histamine infusion threefold caused no further rise in acid output, but it caused an additional small increase in mucosal blood flow. The i.v. infusion of (15S)-15-methyl prostaglandin E_2 methyl ester in doses of 0.2 μg/kg/min slightly increased resting mucosal blood flow. Histamine was infused i.v. (16.5-50 μg/kg/min) 1 hr later and gave a dose dependent fall in blood pressure and an increase in mucosal blood flow, but had no effect on acid output. When acid secretion was inhibited by the histamine H2-receptor antagonists burimamide (200 μg/kg/min i.v.) and metiamide (50 μg/kg/min i.v.), histamine still increased mucosal blood flow. The use of H1-receptor antagonists to inhibit the histamine induced hyperemia was made difficult by their vasodilator actions. The selective histamine H2-receptor agonist, 4-methyl histamine, had no effect on arterial blood pressure in doses (100-150 μg/kg/min i.v.), which stimulated acid secretion. The increase in mucosal blood flow, which accompanied the stimulation of acid secretion, was inhibited by metiamide (50 μg/kg/min i.v.), 4-methyl-histamine (50-100 μg/kg/min i.v.), and (15S)-15-methyl prostaglandin E2 (0.2 μg/kg/min) infusion. These results suggest that histamine H2-receptors, primarily concerned with acid secretion, and H1-receptors, concerned with vasodilation, are both present in the rat gastric mucosa.

2379 THE EFFECT OF CAERULEIN ON GASTRIC MUCOSAL BLOOD-FLOW AND GASTRIC SECRETION. (Ger.) Koch, H.; Belohlavek, D.; Demling, L. (Medizinische Universitatsklinik, 8520 Erlangen, Krankenhausstrasse 12, West Germany). *Klin. Wochenschr.* 53(9):447-448; 1975.

The effect of cerulein on the mucosal blood flow, gastric acid secretion, and pepsin secretion was investigated in 15 patients. Cerulein (0.1 μg/kg/hr) significantly inhibited the gastric mucosal blood flow ($p<0.005$) and the acid secretion ($0.05>p>0.01$), which had been stimulated by pentagastrin (1.5 μg/kg/hr). Pepsin secretion stimulated with pentagastrin also decreased, but not significantly. However, cerulein caused a slight but statistically insignificant increase in acid secretion stimulated by histamine (40 μg/kg/hr). At the same time, gastric mucosal blood flow and pepsin output decreased slightly but not significantly. The reduction of acid output when cerulein was administered together with pentagastrin is thought to be due to competitive inhibition, since the two substances have a similar chemical structure. The mucosal blood flow of the stomach, measured with the heat-clearance technique, also decreased when cerulein was administered after pentagastrin stimulation. The fact that the mucosal blood flow remains unchanged after the administration of histamine suggests that the reduction in mucosal blood flow observed with pentagastrin is a consequence, and not the cause, of the acid inhibition occurring at the same stage.

2380 THE CHEMICALS THAT ACTIVATE THE "ON" SWITCHES OF THE OXYNTIC CELL. (Eng.) Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Mayo Clin. Proc.* 50(9): 515-518; 1975.

2381 DECREASED MITOTIC ACTIVITY IN THE STOMACH, DUODENUM AND COLON OF RATS TREATED WITH HIGH DOSES OF HISTAMINE. (Eng.) Pishva, N.; Mann, M.; Abtahi, F. S.; Djahanguiri, B. (Sch. Medicine, Univ. Tehran, Tehran, Iran). *Pharmacology* 13(3):1-4; 1975.

2382 DIURNAL RHYTHM OF GASTRIN AND GLUCAGON [Abstract]. (Eng.) Ellis, B. W.; Russell, R. C. G.; Bloom, S. R.; Dudley, H. A. F. (St. Mary's Hosp., London, England). *Br. J. Surg.* 62(8):664; 1975.

2383 ACID-BASE BALANCE IN AMPHIBIAN GASTRIC MUCOSA. (Eng.) Silen, W.; Machen, T. E.; Forte, J. G. (Dept. Physiology-Anatomy, Univ. California, Berkeley, CA 94720). *Am. J. Physiol.* 229(3): 721-730; 1975.

2384 THE INHIBITION OF GASTRIC ACID SECRETION BY EPIDERMAL GROWTH FACTOR. (Eng.) Bower, J. M.; Camble, R.; Gregory, H.; Gerring, E. L.; Willshire, I. R. (Imperial Chemical Industries Ltd., Mereside Alderley Park, Macclesfield, Cheshire SK10 4TG, England). *Experientia* 31(7):825-826; 1975.

2385 THE EFFECT OF PROPRANOLOL AND PHENTOLAMINE ON SERUM GASTRIN CONCENTRATION IN RESPONSE TO RESPIRATORY ACIDOSIS IN NORMAL MAN. (Eng.) Kaess, H.; Utz, G.; Teckentrup, U.; Hauck, A. M.; Dorner, M. (Dept. Internal Medicine, Univ. Heidelberg, W. Germany). *Eur. J. Clin. Invest.* 5(5):401-408; 1975.

2386 GASTRIC ACID STIMULATING ACTION OF CYSTEAMINE IN THE RAT. (Eng.) Ishii, Y.; Fujii, Y.; Homma, M. (Res. Lab., Nippon Kayaku Co., Shimo, Tokyo 115, Japan). *Eur. J. Pharmacol.* 36(2): 331-336; 1976.

2387 EFFECT OF 5-HYDROXYTRYPTAMINE ANTAGONIST ON GASTRIC SECRETION IN ALBINO RATS. (Eng.) Debnath, P. K.; Goel, R. K.; Sanyal, A. K. (Dept. Pharmacology, Banaras Hindu Univ., Varanasi-221005, India). *Indian J. Med. Res.* 62(12):1688-1693; 1975.

2388 EFFECT OF A NEW SYNTHETIC PROSTAGLANDIN ON ACID GASTRIC SECRETION OF DIFFERENT LABORATORY ANIMALS. (Eng.) Impicciatore, M.; Usardi, M. M.; Bertaccini, G. (Erba Res. Lab., Milan, Italy). *Pharmacol. Res. Commun.* 8(2):187-198; 1976.

2389 DECREASED GASTRIC SECRETION ON RATS TREATED WITH STANNOUS CHLORIDE. (Eng.) Yamaguchi, M.; Naganawa, M.; Yamamoto, T. (Shizuoka Coll. Pharmaceutical Science, Shizuika-shi, Japan). *Toxicol. Appl. Pharmacol.* 36(1):199-200; 1976.

2390 ADRENERGIC ACTIVITY AND GASTRIC SECRETION (39280). (Eng.) Magee, D. F. (Creighton Univ. Sch. Medicine, 2500 California St., Omaha, NB 68178). *Proc. Soc. Exp. Biol. Med.* 151(4):659-662; 1976.

See also, 2333, 2363, 2424, 2495, 2625.

SECRETION AND METABOLISM

Pancreas

2391 MICROCANNULATION--A NEW MICROPUNCTURE TECHNIQUE APPLICATION IN CAT PANCREAS SECRETION. (Eng.) Reber, H. A.; Lightwood, R. (Univ. California Sch. Medicine, San Francisco, CA 94121). *J. Appl. Physiol.* 40(6):984-986; 1976.

A new micropuncture technique of microcannulation was developed and applied in cats to study exocrine secretion in the pancreatic ducts. Two micropipets of different diameters were assembled with the smaller pipet (10-20 μm) mounted inside the larger (25-50 μm). Using this combination, a larger pancreatic duct (<300 μm) was punctured, and the inner pipet was advanced into the lumen of a small (20-50 μm) duct, which was otherwise inaccessible. In anesthetized cats during maximal stimulation with secretin (GIH, 4-6 U/kg/hr, i.v.), the average chloride concentration of juice obtained from small ducts (25-50 μm) was 106 ± 3 mEq/l and from large ducts (50-150 μm) was 75 ± 5 mEq/l. The results were confirmed by conventional micropuncture techniques, which were technically more difficult. This new method for collecting fluid from small ducts is more physiological than direct micropuncture, and is, therefore, a useful addition to micropuncture methodology.

2392 THE ACCUMULATION OF BASIC AMINO ACID RESIDUES, THE AUTOLYSIS RATE, AND THE RELATIVE LENGTH OF THE INTESTINE DURING THE FORMATION OF TRYPSIN. (Ger.) Muller, K.; Zwilling, R. (Zoologisches Institut II, Universitat, D-69 Heidelberg, Im Neuenheimer Feld 230, Germany). *Hoppe Seylers Z. Physiol. Chem.* 356(7):1173-1175; 1975.

2393 PANCREATIC EXOCRINE SECRETION. (Eng.) Preshaw, R. M. *In: Gastrointestinal Physiology.* Edited by E. D. Jacobson and L. L. Shanbour (Baltimore: University Park Press): vol. 4, pp. 265-292; 1974.

2394 INHIBITION SPECTRA OF THE HUMAN PANCREATIC ENDOPEPTIDASES. (Eng.) Mallory, P. A.; Travis, J. (Dept. Biochemistry, Univ. Georgia, Athens, GA 30602). *Am. J. Clin. Nutr.* 28(8):823-830; 1975.

2395 EFFECT OF MURINE HEPATITIS VIRUS ON THE PANCREAS IN MICE. (Fre.) Fujiwara, K.; Tamura, T.; Hirano, N.; Takenaka, S. (Institut Medical Sciences, Univ. Tokyo, Minato-ku, Tokyo 108, Japan). *C. R. Soc. Biol. (Paris)* 69(2):477-480; 1974.

2396 SECRETION-COUPLING IN THE EXOCRINE PANCREA (Eng.) Schulz, I.; Milutonovic, S. (Max-Planck-Inst. for Biophys., Frankfurt, Germany). *Fed. Proc.* 34(3):326; 1975.

See also, 2401, 2432, 2488.

SECRETION AND METABOLISM

Hepatobiliary Tract

2397 INTRAVENOUS CHOLANGIOGRAPHY IN THE RHESUS MONKEY. PART I: DETERMINATION OF OPTIMAL IODIPAMIDE DOSE DURING A ONE HOUR INFUSION. (Eng.) Wittenberg, J.; Maturi, R. A.; Williams, L. F., Jr.; Teplick, S. K.; Preblud, S. R.; O'Brien, J. J.; Small, D. M. (Massachusetts General Hosp., Boston, MA 02114). *Invest. Radiol.* 11(1):45-53; 1976.

A 1-hr i.v. infusion cholangiography was performed in three rhesus monkeys with intact enterohepatic circulation to determine optimal iodipamide dose. Four different doses, including the standard (0.3-ml/kg) and double dose (0.6-ml/kg), as well as 0.1 ml/kg and 1.2 ml/kg levels were compared. The 0.6-ml/kg dose resulted in significantly higher biliary iodine excretion ($p<0.05$) and concentration ($p<0.05$) than the lower two doses. A 1.2-ml/kg dose caused an increase in biliary iodine concentration when compared to the 0.6-ml/kg dose, but it did not increase iodine excretion. Peak iodine excretion and concentration occurred, on the average, at 1 hr. Total bile flow was linearly related to total iodine excretion. For each 10-mg increase in excreted iodine, there was an average increase of 0.64 ml of excreted bile. The results indicate that an infusion of iodipamide is accompanied by a considerable choleretic effect, which is positively related to the dose.

2398 ANIMAL EXPERIMENTS ON THE DISTRIBUTION AND EXCRETION OF AN INTRAVENOUSLY INJECTED BILIARY CONTRAST MEDIUM (IOGLYCOMATE). (Ger.) Hilweg, V. (Evangelischen Bethesda-Krankenhauses, Heerstrasse 219, 4100 Duisberg, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 124(4):320-327; 1976.

The distribution and excretion of an i.v. injected, radioactive biliary contrast medium (Ioglycomate) were studied in dwarf pigs after the induction of choledochal, thoracic duct, and gallbladder fistulae. The investigations were carried out with free lymph and bile flow during artificial cholestasis and after occluding both ureters. Following the i.v. injection of 0.24-1.0 ml Bilivistan, there was a choleresis of up to six times the original value. The thoracic duct lymph showed only a small volume rise. The lymphatic circulation played no significant quantitative role in contrast distribution of Ioglycomate in the animal, nor did it influence the blood clearance curves. During normal bile flow, only 1.3% of the injected dose appeared in the thoracic duct within 3 hr, and during acute biliary obstru tion, only 2.6% appeared. The investigations indicat a transport maximum of 2.9 mg/min/kg for Ioglycomate, in the dwarf pig.

2399 SATURATION KINETICS OF IOPANOATE IN DOGS WITH AN INTACT ENTEROHEPATIC CIRCULATION BEFORE AND AFTER PHENOBARBITAL INDUCTION. (Eng.)

Herzog, R. J.; Nelson, J. A.; Staubus, A. E. (Univ. California Sch. Medicine, M-380, San Francisco, CA 94143). *Invest. Radiol.* 11(1):32-38; 1976.

Capacity-limited elimination of sodium iopanoate and a reproducible apparent transport maximum (Tm) were demonstrated in four nonoperated mongrel dogs. A constant infusion of iopanoate was administered i.v. at 3 different infusion rates (7.66 mg/min, 6.06 mg/min, and 5.12 mg/min) over a 3-hr period. Blood and urine samples were taken by catheterization. In all cases, the plot of blood iodine concentration against time became linear above the level of 30-40 mg of iodine/l of whole blood. The average apparent Tm/kg of iopanoate in the four dogs was 0.25 mg/min/kg. One to two months later, each dog was given 5 mg/kg/day sodium phenobarbital for 10 days, and the experiment was repeated. Phenobarbital levels in the blood of the four dogs ranged from 1.0 to 2.2 mg%. There was a linear relation between blood iodine concentration and time and blood concentration as related to the infusion rates. The apparent Tm of iopanoate after phenobarbital induction was greater than the control value of apparent Tm ($p<0.05$). It is concluded that the multiple infusion technique, developed using dogs with chronic bile fistulas is an accurate method for determining the apparent Tm of iopanoate in healthy, nonoperated dogs with normal bile salt pool.

2400 MEASUREMENT AND ALTERATION OF THE CAPACITY OF THE DISTENDED BILIARY TREE IN THE RAT. (Eng.)

Peterson, R. E.; Olson, J. R.; Fujimoto, J. M. (Univ. Wisconsin, Center for Health Sciences, Madison, WI 53706). *Toxicol. Appl. Pharmacol.* 36(2): 353-368; 1976.

A retrograde-push-back (RPB) technique was developed to estimate capacity of the biliary tree in the distended state, and this technique was applied to the rat, hamster, rabbit, and guinea pig. The technique involved establishing a relatively constant rate of [^{3}H]mannitol excretion in bile, retrogradely infusing saline into the biliary tree to clear the biliary system of mannitol, and estimating capacity as the volume of biliary fluid recollected to the point where excretion of mannitol was reestablished to half of the original rate. In male Sprague-Dawley rats, distended capacity was 37.3 ± 4.4 μl for animals with a mean liver weight of 10 g. Significant re-entry of [^{3}H]mannitol into the biliary tree occurred if the occlusion was maintained for longer periods. These facets of the method were investigated by measuring intrabiliary pressures in relation to distended capacities. Even though a linear relation existed between the liver and rat body weights, a linear relation could not be established between liver weights and distended capacities. Thus, it seems inappropriate to express distended capacities on a microliters per gram of liver basis. In another group of rats, i.v. treatment with sodium taurolithocholate (12.5 μmol/kg, i.v.) reduced the distended capacity to 25.2 ± 2.8 μl from a control value of 32.9 ± 1.0 μl. In rats treated with phenobarbital sodium (75 mg/kg, i.p., once daily) for 4 days, the increase in liver wet weight was not accompanied by an increase in distended biliary tree capacity. In the hamster (liver weight, 4.4 g) and rabbit (liver weight, 82.6 g), the distended capacities were 18.9 ± 1.8 and 849 ± 86 μl, resp. In the guinea pig, RPB with [^{3}H]mannitol produced an overshooting effect above the steady state excretion values. With [^{14}C]erythritol, this overshooting effect was not obtained, and a distended capacity estimate of 111 ± 8 μl was obtained for livers that weighed 22 g. Thus, the authors conclude that this RPB technique is useful for estimating the distended capacity of the biliary tree in the rat, hamster, and rabbit. Erythritol provides a better estimation than mannitol in the guinea pig as the bile to plasma ratio approaches 1.

2401 SIMULTANEOUS MEASUREMENT OF THE PANCREATIC AND BILIARY RESPONSE TO CCK AND SECRETIN. PRIMATE BILIARY PHYSIOLOGY XIII. (Eng.)

Gardiner, B. N.; Small, D. M. (Letterman Army Inst. Res., Presidio San Francisco, CA 94129). *Gastroenterology* 70(3):403-407; 1976.

A new model, designed to allow the simultaneous sampling of bile, pancreatic, and stomach fluid without significantly altering the normal enterohepatic circulation, is described. This system was used to monitor bile and pancreatic responses to exogenous cholecystokinin (CCK) and secretin. Tubes were surgically placed in the common bile duct and pancreatic ampulla of Rhesus monkeys to enable the separate collection of 5% of the output of each organ with the return of 95% of each fluid to the duodenum. A catheter was introduced into the stomach to prevent gastric acid from entering the duodenum. Secretin was found to increase the secretion of bile fluid (185% above control), pancreatic fluid, and HCO_3^- but to have no significant effect on pancreatic protein secretion. CCK was found to increase bile flow (70% above control), and pancreatic protein secretion (90% of control), and to mildly stimulate pancreatic and HCO_3^- secretions. High doses of CCK inhibited the activities, whereas no maximum response was found with secretin doses up to 5 U/kg. It is concluded that exogenous CCK and secretin influence bile flow at doses that produce submaximal responses from the pancreas.

2402 CIRCADIAN DISTRIBUTION OF BILE ACIDS IN THE ENTEROHEPATIC CIRCULATORY SYSTEM IN RATS. (Eng.)

Ho, K. J. (Dept. Pathology, Univ. Alabama, Birmingham, AL 35294). *Am. J. Physiol.* 230(5):1331-1335; 1976.

The possible existence of a circadian variation of bile acid distribution was studied in Sprague-Dawley rats to account for the persistent daily fluctuation of hepatic cholesterol and bile acid synthetic activity. The bile acid pool was first determined in six adult, male rats to be 12.8 mg/100 g by comparing the total radioactivity of tritiated bile acid drained through the bile fistula and the initial bile acid specific activity. The distribution of bile acids in the enterohepatic circulatory system at various times of the day was then studied in 24 additional rats; each received a single dose of tritiated taurocholate i.p. and was sacrificed 24 hr later. The nearly complete recovery of the administered radioactivity from the serum, liver, intestinal wall and content, and 24-hr feces indicated the confinement of bile acids to the enterohepatic circulation. A circadian fluctuation of the bile acid content was observed in serum, liver, and intestinal contents. The patterns of such rhythmic change varied in different segments of the intestinal tract but seemed to correlate with the time sequence of movement of bowel content and absorption of bile acids. The circadian rhythm of hepatic synthesis of bile acids, but not of cholesterol, observed by others may be, in part, directly related to the circadian fluctuation of the amount of bile acids in the liver.

2403 EFFECT OF CHOLESTEROL FEEDING ON CIRCADIAN RHYTHM OF HEPATIC AND INTESTINAL CHOLESTEROL BIOSYNTHESIS IN HAMSTERS.

(Eng.) Ho, H.-J. (Univ. Alabama in Birmingham, Medical Center, Birmingham, AL 35294). *Proc. Soc. Exp. Biol. Med.* 150(2):271-277; 1975.

Experiments were conducted to determine whether a circadian rhythm of hepatic and intestinal activity, similar to that found in rats, exists in hamsters and to evaluate the effect of cholesterol feeding on such rhythmic changes. Forty-eight adult hamsters were divided equally into two groups, which were fed a control diet and a 2% cholesterol diet, resp., under a rigid lighting (6 PM-6 AM) and feeding (6 PM-8 AM) schedule for 3 weeks. The cholesterol synthetic activity of the liver, stomach, small intestine, cecum, colon, and kidney was measured by *in vivo* conversion of acetate-1-^{14}C to cholesterol in four animals at 4-hr intervals. A remarkable circadian rhythm, with the peak at midnight and the nadir at noon, was found in the liver of the control hamsters, but it was absent in the cholesterol-fed animals, since the activity was nearly totally suppressed at all times. The small intestine exhibited a similar rhythm, with the peak at midnight, but maintained a high baseline activity from 8 AM to 6 PM. Cholesterol feeding did not alter the baseline activity but it reduced 17% of the peak activity. The other organs failed to show such a circadian rhythm. It is postulated that food, which is low in cholesterol, stimulates cholesterol synthesis in the intestinal mucosa during the process of absorption; when the absorbed food subsequently reaches the liver, it stimulates the hepatic cholesterol synthesis. The circadian rhythm observed in hepatic and intestinal cholesterol synthetic activity in hamsters is quite similar to that observed in rats.

2404 STUDIES OF HUMAN BILE: VI. INFLUENCE OF DIETS LOW IN FAT ON THE COMPOSITION OF BILE IN HEALTHY SUBJECTS.

(Eng.) Dam, H.; Prange, I.; Jensen, M. K.; Stilling, B.; Bremmelgaard, A. (Polytechnic Inst., Copenhagen, Denmark). *Z. Ernaehrungswiss.* 14(1):1-17; 1975.

The influence of dietary fat restriction for a 4- to 6-week period on the composition of duodenal bile was investigated in ten healthy women. Duodenal bile was collected furing fasting, and after injecti of cholecystokinin twice before and once at the conclusion of the diet. Total dietary fat was 11.7-19.8 g/2,000 kcal. Corresponding intakes of cholesterol and linoleic acid were 114-302 mg and 3.0-9.7 g/2,000 kcal. In 11 subjects, mean serum cholesterol declined from 5.7 to 4.76 mM after 6 weeks, and in 4 subjects, the 10-week mean cholesterol value was 4.83 mM. Mean molar ratios of total bile acid to cholesterol were 9.47 before fat restriction and 12.52 at 6 weeks, in 11 cases. In 3 subjects who underwent 10-week diets, the initial ratio was 7.15 with 6- and 10-week values of 8.69 and 9.53, resp. The mean molar ratio of phospholipid to cholesterol in 11 subjects on a 6-week diet was 2.78 before and 2.98 after the diet. In 3 subjects on a 10 week diet, the zero time, 6-week, and 10-week values were 3.16, 3.05, and 2.44, resp. All mean ratios corresponded to moderate supersaturation with cholesterol as compared with established limits for the solubility of cholesterol in aqueous solution. It is suggested that in a population that is accustomed to a high fat intake, subsistence on a low fat diet, over a prolonged period, will reduce the phospholipid to cholesterol ratio.

2405 METABOLISM OF DEOXYCHOLIC ACID IN MAN.

(Eng.) Matern, S.; Sjovall, J.; Pomare, E. W.; Heaton, K. W.; Low-Beer, T. S. (Karolinska Institutet, S-104 01 Stockholm 60, Sweden). *Med. Biol.* 53(2):107-113; 1975.

The metabolism of [24-^{14}C]deoxycholic acid was studied in six patients with cholecystectomy and in two patients with intact gallbladder, all with an intact enterohepatic circulation. Three microcuries of filtered labeled deoxycholic acid in saline were injected i.v. in each patient, and duodenal bile samples were aspirated 24 and 96 hr later; the bile samples were analyzed for metabolites of deoxycholic acid in nonsulfated and sulfated fractions. Two metabolites were identified in hydrolyzed duodenal bile: 3α-hydroxy-12-oxo-5β-cholanoic and 3β,12-α-dihydroxy-5β-cholanoic acids. Quantitative analysis of one sample showed the amounts of these compounds to be only about 2 and 0.5%, resp., of the amount of deoxycholic acid. A small percentage of deoxycholic acid (less than 3%) was found in a fraction having the chromatographic property of conjugated bile acid sulfates. About 15% of the identified metabolites were found in this fraction, which also contained more than 50% of the biliary lithocholate and 90% of the biliary 3β-hydroxy-5-cholenoate. The results support the view that deoxycholic acid undergoes little metabolism during enterohepatic circulation in man.

2406 DIFFERENT SELECTIVITIES IN ACYLATION AND METHYLATION PATHWAYS OF PHOSPHATIDYLCHOLINE FORMATION IN GUINEA PIG AND RAT LIVERS.

(Eng.) MacDonald, G.; Thompson, W. (Dept. Biochemistry, Univ. Toronto, Toronto M5S 1A8, Canada). *Biochem. Biophys. Acta* 398(3):424-432; 1975.

"Indirect pathways" of phosphatidylcholine synthesis were studied *in vivo* in guinea pig and rat livers. Radioactivity from i.p. or intraportally injected 1-acyl-*sn*-glycero-3-phosphorylcholine, doubly labeled in either palmitoyl, glycerol, or phosphoryl moieties, was incorporated largely into disaturated or mixed disaturated-oligoenoic fractions of phosphatidylcholine in guinea pig liver. In rat liver, the tetraenoic class was the most highly labeled, and only very low radioactivity was recovered from disaturated or monoenoic species. The methylation of phosphatidylethanolamine to phosphatidylcholine, as judged by the incorporation of i.p. injected L-[*Me*-^{14}C]methionine, involved selectively tetraenoic and polyenoic (>4 double bonds) classes in rat liver. In guinea pig liver, methylation activity was much lower and it led to the formation principally of dienoic classes of phosphatidylcholine. These experiments confirm that in rat liver, which has a high level of polyunsaturated classes of phosphatidylcholine, the indirect pathways of synthesis give rise chiefly to these classes. However, the priorities in guinea pig liver are different, since the levels of polyunsaturated classes are much lower, and although the indirect pathways of synthesis are operative, they are directed mainly toward the formation of more saturated classes.

2407 TRANSFER OF ESTERIFIED CHOLESTEROL FROM SERUM LIPOPROTEINS TO THE LIVER.

(Eng.) Goodman, Z. D.; Lequire, V. S. (Vanderbilt Univ. Sch. Med., Nashville, TN). *Biochim. Biophys. Acta* 398(2):325-336; 1975.

The fate of cholesteryl esters of the serum lipoproteins was studied in fasted intact Holtzman rats and in isolated perfused rat livers. The lipoproteins of fasting rat serum were labeled *in vitro* with [^{3}H]cholesteryl oleate. Following i.v. injection, the majority of the radioactive ester was rapidly taken up by the liver where hydrolysis of the ester bond occurred. At 5 min, 58% of the injected material was recovered in the liver, 85% of which was still in the ester form, while at 30 min, only 22% of the liver radioactivity was in cholesteryl esters. There was little difference in the rate at which radioactivity was taken up from the different lipoprotein classes. Similar findings were observed in the perfused liver, but there was no change in the concentrations of free or esterified cholesterol in the perfusing medium, indicating that the lipoprotein cholesteryl ester was gaining access to the liver through an exchange of molecules. After uptake, cell fractionation experiments showed that the plasma membranes had the greatest relative amounts of radioactivity, suggesting that this was the site of exchange. Small amounts of radioactivity were recovered in the bile, demonstrating that serum lipoproteins can serve as precursors of at least some of the bile steroids.

2408 ROLE OF MEMBRANES IN BILE FORMATION: COMPARISON OF THE COMPOSITION OF BILE AND A LIVER BILE-CANALICULAR PLASMA-MEMBRANE SUBFRACTION.

(Eng.) Evans, W. H.; Kremmer, T.; Culvenor, J. G. (Natl. Inst. Medical Res., Mill Hill, London NW7 1AA, U.K.). *Biochem. J.* 154(3):589-595; 1976.

Enzymes, proteins, glycoproteins, and lipids of rodent bile (Sprague-Dawley rats or Parke's white mice) were compared with those of a plasma-membrane subfraction originating from the hepatocyte bile-canalicular membrane. Three bile-canalicular glycoprotein enzyme activities were detected in bile. Comparison of the pH optimum and immunoinhibition properties of membrane and bile 5'-nucleotidase activity indicated that they were the same enzyme. Correspondence between membrane and bile alkaline phosphodiesterases also suggested that they were the same enzymes. Activities of Mg^{2+}-stimulated adenosine triphosphatase (a lipid-dependent intrinsic membrane protein) and galactosyltransferase (a Golgi membrane marker) were not detected in bile. Rodent bile contained 15 polypeptide bands that differed radically from those of bile-canalicular membranes. Bands that may correspond in molecular weight to liver plasma-membrane glycoproteins were present at low staining intensities in bile. A major protein of apparent molecular weight 49,500 was present, and albumin was detected by immunodiffusion. The lipid composition of bile and bile-canalicular membrane also differed. Phosphatidylcholine accounted for 82% of rat bile phospholipids, and only trace amounts of phosphatidylinositol, phosphatidylserine, and sphingomyelin were present. The results indicate that in healthy animals, the bile-canalicular membrane is refractory to the action of bile acids during the secretory process. The presence of only small amounts of bile-canalicular membrane components, especially glycoprotein enzymes located at the outer face of the membrane, suggests that these are released from the membrane by bile acids after secretion of bile into the canalicular spaces.

2409 ULTRASTRUCTURAL AND STEREOLOGICAL STUDY ON THE EFFECT OF VITAMIN E ON LIVER MITOCHONDRIAL MEMBRANES.

(Eng.) Frigg, M.; Rohr, H. P. (F. Hoffmann-La Roche & Co., 4002 Basle, Switzerland). *Exp. Mol. Pathol.* 24(2):236-243; 1976.

The effect of vitamin E on liver mitochondrial membranes was studied ultrastructurally and stereologically. Fifteen male hybrid mice (initial weight 20-24 gm) were divided equally into a vitamin E-deficient group, a vitamin E-supplement group, and a standard diet control group. After 17 weeks, left liver lobule tissue samples were obtained. Vitamin E deficiency was determined by a modified hemolysis test using two dialuric acid concentrations (4 mg/l and 16 mg/l). Ultrastructurally, no descriptive differences were observed in the three trial groups. Stereologically, the volume density and mean single volume of the mitochondria were unchanged in all three groups. However, mitochondrial inner membrane surface density was increased significantly and surface-to-volume density ratio was higher in the vitamin E-deficient group than in the other two groups. Mitochondrial inner membrane near enzyme distance (center-to-center distance) was calculated to confirm this evidence of membrane proliferation. The mean distance of the four cytochrome molecules was in the 180-230 A range in the control group. Enzyme distances increased 30-40% in the vitamin E-supplement group, and these dimensions were nearly doubled in the vitamin E-deficient group. The findings indicate that formation of liver mitochondrial inner membrane is enhanced and cytochrome density is reduced in vitamin E deficiency.

2410 EFFECT OF CHRONIC ETHANOL TREATMENT ON METABOLISM OF DRUGS IN VITRO AND IN VIVO.

(Eng.) Khanna, J. M.; Kalant, H.; Yee, Y.; Chung, S.; Siemens, A. J. (Univ. Toronto, Dept. Pharmacology, Ontario, Toronto, Canada). *Biochem. Pharmacol.* 25(3):329-335; 1976.

The effect of chronic ethanol treatment on the metabolism of drugs *in vitro* and *in vivo* was investigated in male Wistar rats. Rats were administered a daily intake of ethanol (10-12 g/kg, 1 month) in either high-fat, adequate-protein (HFAP) or low-fat, high-protein (LFHP) liquid diets. For both HFAP and LFHP diets, there were significant increases in liver weights ($p<0.001$ and $p<0.01$, resp.), microsomal protein ($p<0.05$ and $p<0.02$, resp.), and microsomal metabolism of 10 μmol aminopyrine ($p<0.001$ and $p<0.02$, resp.), 0.59 μmol zoxazolamine ($p<0.01$ and $p<0.005$, resp.), 25 μmol aniline ($p<0.005$ and $p<0.001$, resp.), and 0.3 mmol meprobamate ($p<0.005$ and $p<0.001$, resp.). Morphine (25 μmol) metabolism was increased only after the HFAP diet ($p<0.01$); pentobarbital metabolism was studied only after HFAP diet, and it was increased ($p<0.005$). The increase *in vitro* was highest with aminopyrine (81% with HFAP and 59% with LFHP) and lowest with pentobarbital (25%). The analysis of variance showed highly significant differences among the various drugs. There were significant interaction effects of drugs and ethanol ($p<0.001$) and drugs and fat content ($p<0.05$), but no significant interaction occurred between ethanol and fat or between drugs and ethanol and fat, except in the case of morphine. The increase *in vivo* was greatest with 30 mg/kg meprobamate ($p<0.01$), it was intermediate with 30 mg/kg aniline and 60 mg/kg zoxazolamine, and it was low with 60 mg/kg aminopyrine; it was absent with pentobarbital. It is concluded that chronic ethanol administration does increase the metabolism of drugs *in vitro* and *in vivo*, but the diversity of effects on different drugs cannot be explained by a single mechanism.

2411 CHANGES IN THE HEPATIC MICROSOMAL ENZYME ACTIVITY DURING LONG-TERM ETHANOL FEEDING IN RAT.

(Eng.) Luoma, P.; Vorne, M. (Dept. Pharmacology, Univ. Oulu, SF-90220 Oulu 22, Finland). *Acta Pharmacol. Toxicol.* 38(3):260-266; 1976.

The effect of long-term ethanol administration on the hepatic microsomal enzymes was investigated in male Sprague-Dawley rats. The animals were given 15% (volume/volume) ethanol *ad libitum* in the drinking water for 4, 6, and 10 weeks. Ethanol caused significant changes in the hepatic microsomal metabolism of methylaniline and *p*-nitrobenzoic acid, and in the microsomal protein and cytochrome P-450 contents, as compared with controls. The effect of ethanol on these parameters was time-related, and maximal changes were measured after 2 weeks of drinking ethanol, after which the effect of ethanol diminished. Within this period, the *N*-demethylation of methylaniline was increased by 63%, and nitroreduction of *p*-nitrobenzoic acid was inhibited by 50%. The microsomal protein content was increased after 2 weeks of drinking ethanol by 30%, and the cytochrome P-450 content by 96%. Glucose-6-phosphate dehydrogenase activity in the 105,000 x *g* supernatant fraction was increased during the whole experiment, and after drinking ethanol for 10 weeks, it was stimulated by 116%. It is suggested that the decreases in the effects caused by ethanol may be related to the development of liver damage during long-term ethanol usage, or they may be caused by some kind of adaption to ethanol.

2412 THE ACTIONS OF AVENACIOLIDE AND ETHANOL ON GLUCOSE METABOLISM AND ON RELATED ENZYME ACTIVITIES IN THE ISOLATED PERFUSED RAT LIVER.

(Eng.) Wimhurst, J. M.; Harris, E. J. (University Coll. London, Dept. Biophysics, Gower St., London WC1E 6BT, England). *Biochim. Biophys. Acta* 437(1): 51-61; 1976.

The metabolic response of male Wistar rat livers to perfusion with 165 mg/100 ml ethanol, with and without 47 mM avenaciolide, was determined by measuring the perfusate levels of glucose, lactate, pyruvate, β-hydroxybutyrate, ethanol, amino acids, urea, and lipid. Analysis of the perfused livers showed changes in the activities of some of the key enzymes of glycolysis, gluconeogeneis, and lipogenesis. Ethanol perfusion decreased the levels of phosphofructokinase ($p<0.02$), glucokinase ($p<0.01$), and cytosolic isocitrate dehydrogenase ($p<0.05$), while avenaciolide lowered pyruvate carboxylase ($p<0.05$), phosphoenolpyruvate carboxykinase ($p<0.01$), and glucokinase ($p<0.02$). Isocitrate dehydrogenase and phosphofructokinase were unchanged, but the ionophore increased the level of fructose-1,6-diphosphatase ($p<0.05$). Ethanol plus avenaciolide showed the same pattern as ethanol alone, together with the decrease in phosphoenolpyruvate carboxykinase ($p<0.001$) found with avenaciolide. Neither ethanol nor avenaciolide had any effect on hexokinase, pyruvate kinase, or acetyl-CoA carboxylase. There were small changes in glucose-6-phosphatase and malic enzyme, and a tendency for citrate lyase levels to decline in avenaciolide perfusions. It is concluded that enzyme levels in perfused liver concentrations can be altered by ethanol administration.

2413 PROTECTIVE EFFECT OF CYSTEINE ON THE INHIBITION OF MITOCHONDRIAL FUNCTIONS BY ACETALDEHYDE.

(Eng.) Cederbaum, A. I.; Rubin, E. (Mount Sinai Sch. Medicine, New York, NY 10029). *Biochem. Pharmacol.* 25(8):963-973; 1976.

The ability of cysteine to reverse the acetaldehyde-induced inhibition of several mitochondrial functions was studied in rat liver mitochondria. Cysteine, *in vitro*, afforded protection against the depression of CO_2 production from palmitate, octanoate, and α-ketoglutarate by acetaldehyde. Relief occurred when the concentrations of cysteine and acetaldehyde were equimolar; greater relief was produced in the presence of excess cysteine. Acetaldehyde had no effect on glutamate-linked state 4 oxygen consumption, whereas the state 3 rate was inhibited. Cysteine almost completely relieved the inhibition of state 3 oxygen uptake, while the state 4 rate was slightly increased. Similar results were obtained with several other NAD^+-dependent substrates. The oxidation of succinate was inhibited only by much higher concentrations of acetaldehyde than those that inhibited the oxidation of NAD^+-dependent substrates. This inhibition was not affected by cysteine. Thiols containing free amino and free sulfhydryl groups in close proximity were the most effective in relieving the inhibition by acetaldehyde. Although a small protective effect was observed, cysteine did not significantly prevent the inhibition of oxidative phosphorylation by acetaldehyde. However, the mitochondria remained coupled in the presence of acetaldehyde plus cysteine. The ability of cysteine and acetaldehyde to interact was demonstrated. It is suggested that cysteine exerts its protective effect by forming a complex with acetaldehyde, thereby preventing acetaldehyde from interacting with the mitochondria.

2414 INFLUENCE OF THE DIET ON THE METABOLISM OF ACETALDEHYDE IN RATS.

(Eng.) Marchner, H.; Tottmar, O. (Inst. Zoophysiology, Univ. Uppsala, Box 560, S-751 22 Uppsala, Sweden). *Acta Pharmacol. Toxicol.* 38(1):59-71; 1976.

Liver acetaldehyde dehydrogenases, the hepatic output of acetaldehyde, and the rate of ethanol elimination were studied in two groups of female Sprague-Dawley rats, which were fed two different commercial standard diets (diet 1 and diet 2). Diet 1 contained extra trace elements (Fe, Cu, Co, I_2, Mn, and Zn) and vitamins (B12, K1, niacin, and choline chloride), which were not included in diet 2. Diet 2 contained 0.005% butylhydroxytoluene. The activity of the mitochondrial low-K_m enzyme was 2-3 times lower in rats fed on diet 1 as compared to rats fed on diet 2, whereas only slight differences were found in the activities of the high-K_m enzymes in the mitochondrial, the microsomal, and the cytosol fractions. No differences were observed between the two groups in the activities of alcohol dehydrogenase, glutamate dehydrogenase, glucose-6-phosphatase, or malic enzyme. Ethanol (1.70 g/kg) was administered i.p. in saline as a 10% (weight/volume) solution. The rate of ethanol elimination was 15% lower and the acetaldehyde level in the blood was 2-4 times higher in rats fed diet 1 as compared to rats fed diet 2. When the diets were interchanged between the two groups, the activity of the low-K_m enzyme increased or decreased twofold within 12 hr. Starvation increased the activity of the low-K_m enzyme in rats fed diet 1, but it had no effect on the activity in rats fed diet 2. The results suggest that diet 1 contains an inhibitor of the low-K_m enzyme, and that dietary factors may be of importance in the regulation of the hepatic output of acetaldehyde during ethanol metabolism.

2415 EFFECTS OF CLOFIBRATE ON SOME MICROSOMAL HYDROXYLATIONS INVOLVED IN THE FORMATION AND METABOLISM OF BILE ACIDS IN RAT LIVER.

(Eng.) Angelin, B.; Bjorkhem, I.; Einarsson, K. (Karolinska Institutet, Stockholm, Sweden). *Biochem. J.* 156(2): 445-448; 1976.

The liver microsomal metabolism of [4-^{14}C]cholesterol, endogenous cholesterol, 7α-hydroxy-4-[6β-^{3}H]cholesten-3-one, 5β-[7β-^{3}H]cholestane-3α,7α-diol, and [^{3}H]lithocholic acid was studied in control and 0.3% clofibrate (ethyl *p*-chlorophenoxyisobutyrate)-treated Sprague-Dawley rats. The extent of 7α-hydroxylation of exogenous [4-^{14}C]cholesterol and endogenous cholesterol was the same in the two groups of rats. The extent of 12α-hydroxylation of the two major metabolites, 7α-hydroxy-4-cholesten-3-one and 5β-cholestane-3α,7α-diol was increased by about 60 and 120%, resp., by clofibrate treatment. The 26-hydroxylation of 5β-cholestane-3α,7α-diol was not significantly affected by clofibrate. The 6β-hydroxylation of lithocholic acid was about 80% higher in the clofibrate treated animals than in the controls. The finding that 12α-hydroxylase was stimulated by clofibrate treatment may have some bearing on recent observations in patients with hyperlipoproteinemia type II (hypercholesterolemia) who have a low ratio between cholic acid and chenodeoxycholic acid synthesis. During treatment with clofibrate, the combined synthesis of cholic acid and chenodeoxycholic acid was unchanged, but the ratio between them increased in five out of six patients.

2416 EFFECTS OF ETHINYL ESTRADIOL AND PHENOBARBITAL ON BILE ACID SYNTHESIS AND BILIARY BILE ACID AND CHOLESTEROL EXCRETION.

(Eng.) Davis, R. A.; Kern, F., Jr. (Univ. Colorado Sch. Medicine, Denver, CO). *Gastroenterology* 70(6):1130-1135; 1976.

The effects of ethinyl estradiol on bile acid synthesis were measured in Sprague-Dawley rats. The effect of simultaneous phenobarbital treatment on reversing the ethinyl estradiol-induced changes in bile composition was also studied. Bile acid synthesis, calculated from respiratory $^{14}CO_2$ derived from the catabolism of [26 or 27-^{14}C]cholesterol to bile acids in rats with intact enterohepatic circulations, decreased 50% after 5 days of ethinyl estradiol treatment (5 mg/kg/day). Maximal derepressed bile acid synthesis was also reduced 50% by ethinyl estradiol treatment. Because ethinyl estradiol did not alter biliary cholesterol excretion, bile contained less bile acid relative to cholesterol. Hepatic bile acid concentration was not increased by ethinyl estradiol treatment. Because the inhibitory effect of ethinyl estradiol on bile acid synthesis required 5 days of treatment, it is concluded that bile acid synthesis probably was not reduced by negative feedback repression of 7α-hydroxylase, the rate-limiting enzyme in bile acid synthesis, which has a half-life of 2-3 hr. During the first 14 hr after bile duct cannulation, before acid pool depletion, ethinyl estradiol-treated rats excreted less than half as much bile acid and the same amount of cholesterol as controls. The bile acid to cholesterol ratio was therefore decreased. Rats, which were treated simultaneously with phenobarbital (80 mg/kg/day) and ethinyl estradiol excreted significantly more bile acid than rats, which were treated with ethinyl estradiol alone, but biliary cholesterol excretion was not increased. The proportion of biliary bile acid relative to cholesterol was thereby restored to the control value. After 14 hr of bile drainage and depletion of the bile acid pool, rats treated with ethinyl estradiol and those treated with phenobarbital-ethinyl estradiol excreted the same amount of bile acid. Thus, the administration of phenobarbital plus ethinyl estradiol increases bile acid pool size and biliary acid excretion, but it does not increase bile acid synthesis.

2417 THE EFFECT OF THYROID HORMONE ON BILE SALT-INDEPENDENT BILE FLOW AND NA^+, K^+-ATPase ACTIVITY IN LIVER PLASMA MEMBRANES ENRICHED IN BILE CANALICULI.

(Eng.) Layden, T. J.; Boyer, J. L. (Westside Veterans Admin. Hosp., Univ. Illinois, Chicago, IL 60612). *J. Clin. Invest.* 57(4): 1009-1018; 1976.

The relation between bile salt-independent canalicular flow and ATPase activity in liver plasma membranes (LPM) that are enriched in bile canaliculi was studied in control, hyperthyroid, and hypothyroid rats. Canalicular bile production was significantly increased in hyperthyroid rats (3.19 µl/min/g liver) as compared with controls (2.27 µl/min/g liver), and it diminished in hypothyroid animals (1.58 µl/min/g liver). Although bile salt excretion was also increased in hyperthyroid animals, the stimulation in canalicular secretion was primarily related to enhancement of the bile salt-independent fraction of flow (2.47 µl/min/g liver in hyperthyroid rats versus 1.67 µl/min/g liver in controls). LPM Na^+, K^+-ATPase activity doubled in hyperthyroid animals (21.5 ± 5.8 versus 10.7 ± 3.1 µmol Pi/mg protein/hr), while Mg^{++}-ATPase activity remained unchanged, and 5'-nucleotidase activity increased to a small but significant extent ($p<0.05$). In hypothyroid rats, bile salt excretion remained unchanged from control values so that the reduced secretion was secondary to an inhibition of bile salt independent secretion (1.19 µl/min/g liver). Na^+, K^+-ATPase activity in LPM's from hypothyroid animals decreased by nearly 50% (5.4 µmol Pi/mg protein/hr), although comparable reductions (30-45%) in the specific activity of Mg^{++}-ATPase and 5'-nucleotidase were also observed. Administration of L-thyroxine (20 µg/100 g body weight) to hypothyroid animals restored both bile salt-independent canalicular secretion and membrane enzymes to control values within 2-4 days. Sodium dodecyl sulfate gel electrophoresis demonstrated no significant changes in LPM protein fractions in any of the treatment groups. These studies indicate that thyroid hormone has a parallel effect on bile salt-independent canalicular secretion and LPM Na^+, K^+-ATPase activity.

2418 EFFECT OF BILE SALTS ON THE HEPATIC REGULATION OF SERUM LECITHIN:CHOLESTEROL ACYLTRANSFERASE ACTIVITY.

(Eng.) Ho, K. J.; Cisternas, R.; Boyd, G. S. (Dept. Pathology, Univ. Alabama Birmingham, Birmingham, AL). *Atherosclerosis* 23(2):145-153; 1976.

The effect of bile salts on lecithin:cholesterol acyltransferase (LCAT) activity was studied in three groups of Wistar rats. In rats, which were fed a 4% cholestyramine diet for 15 days, a 30% increase in serum LCAT activity was detected by radioimmunoassay, and this was accompanied by a simultaneous decrease of the serum esterified cholesterol concentration; the serum free cholesterol concentration remained unchanged. After bile duct ligation, the serum free cholesterol concentration increased progressively, whereas the mean serum LCAT activities of three groups of rats killed 2, 6, and 8 hr after ligation were 39, 51, and 140%, resp., of that of the sham-operated control rats. Eighty-two rats were used in 23 isolated liver perfusion studies including 10 "perfusions" performed without the liver circuit. These studies revealed a remarkable degree of nonenzymic degradation of the enzyme during perfusion. Perfusion of livers from rats previously fed a 4% cholestyramine diet resulted in a delay of the initial decline of perfusate LCAT activity associated with the maintenance of a steady state during the third and fourth hours of the perfusion. Such phenomena were abolished by addition of sodium taurocholate to the perfusate (5 mg/dl), suggesting a direct inhibitory effect of bile salts on the hepatic synthesis and release of LCAT.

2419 IS FATTY LIVER INDUCTION A GENERAL FEATURE OF THE ADMINISTRATION OF FOREIGN SULFHYDRYL COMPOUNDS?

(Eng.) Sabourault, D.; Giudicelli, Y.; Nordmann, R.; Nordmann, J. (Hospital de la Salpetriere, 47, Bd. de l'Hopital, 75013, Paris, France). *Biochim. Biophys. Acta* 431(2):241-248; 1976.

The effects of 2-mercaptoethanol on the liver of Wistar rats were compared with those of 2-mercaptoacetate and 2-mercaptopropionate to determine whether fatty liver is a common result of the administration of thiol-bearing compounds. The i.p. administration of 2-mercaptoethanol or 2-mercaptoacetate (40 µM/100 g body weight) induced a fatty liver, a marked and early increase of free fatty acids, and a decrease of triacylglycerol and phospholipids in the blood. These changes were accompanied by a decrease of the ketone body level and the β-hydroxybutyrate/acetoacetate ratio in the liver. Under the same experimental conditions, however, administration of 2-mercaptopropionate failed to induce a fatty liver and did not modify the hepatic ketone body level of the blood triacylglycerol and free fatty acid levels. The results indicate that fatty liver induction is not a general feature of foreign thiols and suggest that increased peripheral fat mobilization, as well as decreased hepatic lipoprotein synthesis and/or release, are responsible for the 2-mercaptoethanol- and 2-mercaptoacetate-induced fatty liver.

2420 ENHANCEMENT OF THE IMMUNE RESPONSE BY A CATABOLIC PRODUCT OF NORMAL RABBIT IgG. EFFECT OF $F(ab')_2$-LIKE FRAGMENT. (Eng.) Kulberg, A. J.; Evnin, D. N.; Tarkhanova, I. A. (N. F. Gamaleya Inst. Epidemiology and Microbiology, Moscow 123098, USSR). *Immunology* 30(5):715-722; 1976.

A factor in the serum of partially hepatectomized rabbit, taken 4 hr after operation, causing the enhancement of the immune response to sheep SRBC in homologous recipients was investigated. The serum of partially hepatectomized rabbits contained a 5.2S IgG fragment antigenically related to peptic $F(ab')_2$ fragment. The i.v. injection of this fragment together with SRBC into rabbits resulted in enhancement of antibody-forming cell (PFC) response and hemagglutinin production. Similar enhancing effect was produced by peptic $F(ab')_2$ fragment obtained from rabbit IgG devoid of anti-SRBC antibodies. Sera of partially hepatectomized rabbits did not contain $F(ab')_2$-like fragments and failed to enhance the immune response if the animals were treated with a proteinase inhibitor ("Trasylol"), indicating that the fragment was a catabolic product of IgG. The results suggest a regulation of immunoglobulin synthesis by a split product of autologous IgG.

2421 HEPATIC BLOOD FLOW AND CARDIAC OUTPUT AFTER PORTA-CAVAL ANASTOMOSIS IN THE RAT. (Eng.) Liehr, H.; Grun, M.; Thiel, H. (Medizinische Universitatsklinik, Josef-Schneider-Strasse 2, 8700 Wurzburg, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 23(1):31-40; 1976.

Hepatic hemodynamics and cardiac output were measured in FW 49 strain rats 3, 6, 14, and 28 days after portacaval anastomosis (PCA) using the flow fraction distribution method (^{131}I-labeled albumin) of cardiac output. Cardiac output was calculated, using Vierordt's principle, from blood volume and measurement of indocyanine green-appearance time (ICG-AT) by ear densitometry. Three days after PCA, cardiac output was increased to 38.7 ± 5.0 ml/min/100 g body weight (normal 23.8), due to an increase of blood volume from 6.3 to 7.5 ml/100 g and a decrease of ICG-AT from 3.6 to 2.8 sec. Arterial hepatic flow fraction of cardiac output increased to 8.7 ± 2.8% (control, 5.5 ± 2.4%). Changes were observed up to day 28. Hepatic blood flow per gram liver tended to stabilize, but was still decreased at day 28 (1.5 ml/min/g liver, control 2.0). It is concluded that the typical hemodynamic changes in human liver cirrhosis can be reproduced by PCA alone. These changes are considered to be compensatory mechanisms for a reduced portal liver blood flow, but these mechanisms do not compensate completely.

2422 COMPARISON OF SULFOBROMOPHTHALEIN (BSP) AND SULFOBROMOPHTHALEIN GLUTATHIONE (BSP-GSH) DISPOSITION UNDER CONDITIONS OF ALTERED LIVER FUNCTION AND IN THE ISOLATED PERFUSED RAT LIVER. (Eng.) Yam, J.; Reeves, M.; Roberts, R. J. (Univ. Iowa, Toxicology Center, Iowa City, IA 52242). *J. Lab. Clin. Med.* 87(3):373-383; 1976.

A comparative study of the disposition of sulfobromophthalein (BSP) and sulfobromophthalein glutathione (BSP-GSH) was conducted in Sprague-Dawley rats. Investigations were performed in control rats, in rats under conditions of altered liver function induced by either 80 mg/kg phenobarbital or α-naphthylisothiocyanate (ANIT) administered i.p., and in the isolated perfused rat liver. The BSP or BSP-GSH was administered, i.v., either as a single bolus injection at a dose of 120 μM/kg or as a constant infusion at a rate of 3.6 μM/kg/min or via the external jugular cannula at a dose of 50 nM/kg/min. The concentration of dye in samples of plasma or bile was determined colorimetrically. A significantly higher percentage of BSP (61 ± 4% versus 48 ± 1% BSP-GSH) was found in the plasma while a higher percentage of BSP-GSH (20 ± 3% versus 9 ± 1% for BSH) was recovered from the liver 1 min after dye injection. There were no differences in the kidneys. When rat livers were perfused with 200 ml perfusion medium to which 4 μM of BSP or BSP-GSH were added, the main recovery of dye was 98 ± 4 and 99 ± 4% for BSP and BSP-GSH, resp. However, with dye infusion of 3.6 μM/kg/min, phenobarbital significantly enhanced the rate of biliary excretion of BSP, but not of BSP-GSH, and ANIT treatment had a greater inhibitory effect on biliary excretion of BSP-GSH than of BSP. The results indicate that in liver function test studies, the selection of dye, the method of administration, and the time of sampling are critically important and must be taken into consideration.

2423 ORTHOTOPIC LIVER TRANSPLANTATION: AN EXPERIMENTAL STUDY ON MECHANISMS OF HEMORRHAGIC DIATHESIS AND THROMBOSIS. (Eng.) Schalm, S. W.; Terpstra, J. L.; Achterberg, J. R.; Noordheck Hegt, V.; Haverkate, F.; Popescu, D. T.; Krom, R. A. F.; Veltkamp, J. J. (Mayo Clinic, Rochester MN 55901). *Surgery* 78(4):499-507; 1975.

The mechanisms of hemorrhagic diathesis after recirculation of the graft and hepatic artery thrombosis following liver transplantation was investigated. Coagulation, fibrinolysis, and platelet function were prospectively studied before and after 28 orthotopic liver transplantations in dogs and pigs. In addition, the arterial anastomoses were evaluated routinely by angiography and, after removal at reintervention or autopsy, they were inspected for thrombosis and tested for fibrinolytic activity and fibrin deposition. Prolonged bleeding without concomitant thrombocytopenia occurred only in the nine dogs with liver transplants that had been previously preserved for 3 to 6 hr prior to the transplant operation. As only two of the nine dogs had postoperative hemorrhage of clinical significance, surgically imperfect hemostasis, facilitated by an acquired platelet dysfunction, is considered to be the principal cause of hemorrhage. Thrombosis of the arterial anastomosis was found in 38% of animals in which an end-to-end anastomosis was made, but it was not encountered with celiac artery-aorta anastomoses. Local factors due to surgical technique therefore appear most important in the pathogenesis of thrombosis of the hepatic artery anastomosis, although the postoperative hyperfibrinogenemia and diminished local and systemic fibrinolytic activity may also contribute.

2424 EFFECT OF STRESS AND ASPIRIN ON EXTRAHEPATIC PORTAL HYPERTENSION IN RATS. (Eng.) Grosfeld, J. L.; Phelps, T. O.; Jesseph, J. M. (James Whitcomb Riley Hosp. Children, 1100 W. Michigan St., Indianapolis, IN 46202). *J. Pediatr. Surg.* 10(5):609-615; 1975.

The effect of stress and aspirin administration was studied in Wistar rats after the induction of extrahepatic portal hypertension by portal venous constriction (PVC). Portal pressures on the fourth postconstriction day were significantly elevated in these rats (28.9 ± 6.6 cm H_2O) when compared to controls (8.9 ± 2.2 cm H_2O). Splenoportograms showed decreased hepatic flow and venous collaterals. Histologic sections showed gastric mucosal congestion in PVC rats. Gastric acid production and H^+ ion equilibration were similar in PVC and control rats. Rats with portal hypertension had a significant increase ($p<0.001$) in mucosal erosions when subjected to a 7-hr restraint stress on the fourth postoperative day. Erosion formation in other animals, which had also been restrained, was significantly augmented by 3 days of aspirin administration (300 mg/day). These data demonstrate an increased susceptibility of PVC rats to nonhemorrhagic stress. This response is clearly augmented by aspirin treatment. Gastric congestion and the known effect of aspirin on gastric mucosal permeability and the gastric mucosal barrier are implicated in these observations. The findings correlate with clinical observations and strongly suggest that aspirin therapy be avoided in children with extrahepatic portal hypertension.

2425 β-ADRENERGIC RECEPTORS IN RAT LIVER: EFFECTS OF ADRENALECTOMY. (Eng.) Wolfe, B. B.; Harden, T. K.; Molinoff, P. B. (Univ. Colorado Medical Center, 4200 East Ninth Ave., Denver, CO 80220). *Proc. Natl. Acad. Sci. USA* 73(4):1343-1347; 1976.

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See also, 2315, 2395, 2479, 2488.

SECRETION AND METABOLISM

Intestine

2467 RIBOSOME STRUCTURE AND CHYLOMICRON FORMATION IN RAT INTESTINAL MUCOSA. (Eng.) Yousef, I. M.; O'Doherty, P. J. A.; Whitter, E. F.; Kuksis, A. (Dept. Pathology, Univ. Toronto, Toronto, Canada, M5G 1L6). *Lab. Invest.* 34(3):256-262; 1976.

Sucrose gradient sedimentation and electron micrograpic studies were made on the ribosomes of intestinal mucosa cells isolated from control, bile fistula, and puromycin-treated Wistar rats. In com parison to controls, there was a 40-60% decrease in polysome content of the cells following i.p. admini tration of 15 mg puromycin or deprivation of lumina choline by creation of a bile fistula. Feeding of

) mg lysolecithin or 5 mg choline to the bile fistu-
a rats, or addition to the isolated cells *in vitro*
).5 mg lysolecithin/tube or 0.1 mg choline chloride/
ıbe), resulted in a complete restoration of the
olysome profile along with lipoprotein synthesis
ıd chylomicron release. Addition of lysolecithin
o isolated cells treated with puromycin *in vitro*
l mg/tube) also brought about a reaggregation of the
ibosomes and a reactivation of phospholipid bio-
ynthesis, without significant effect on the lipo-
rotein synthesis and release of chylomicrons. Choline
ad no detectable effect on phospholipid synthesis
r ribosome aggregation, when fed to puromycin-treated
ats or when added to puromycin-treated cells *in*
tro. The results suggest that chylomicron forma-
ion and the release by the mucosal cells depend
pon intact rough endoplasmic reticulum, an active
rotein, and phospholipid biosynthesis. The role
f lysolecithin in this process is rationalized on
ne basis of its ability to supply a precursor of
ecithin as well as a surfactant, which affects the
ggregation, or membrane rebinding of ribosomes, or
oth.

68 γ-GLUTAMYLTRANSPEPTIDASE IN INTESTINAL BRUSH BORDER MEMBRANES.

(Eng.) Curthoys,
P.; Shapiro, R. (Univ. Pittsburgh, Sch. Medicine,
ttsburgh, PA 15261). *FEBS Lett.* 58(1):230-233;
75.

Glutamyltranspeptidase activity in the rat small
testine was studied. Crude homogenates of rat
dney and of isolated villus cells were homogenized
phosphate-buffered saline. γ-Glutamyltranspepti-
se activity was measured with 3 mM γ-glutamyl-*p*-
troanilide and 50 mM imidazole at pH 7.2. The
ecific activity of γ-glutamyl-transpeptidase in
olated villus cells of the small intestine was
proximately 100-fold less than that observed in
ude homogenates of kidney. However, in the ab-
nce of malate, the addition of various amino
ids caused a similar activation of γ-glutamyl-
anspeptidase in both preparations. In addition,
quential elution of villus to crypt cells and
eparation of intestinal brush border membranes
dicated that the γ-glutamyltranspeptidase is
calized primarily in the brush border membrane
the villus cells of the rat small intestine.

69 RELEASE OF PEPTIDE HYDROLASES DURING INCUBATION OF INTACT INTESTINAL SEGMENTS IN TRO.

(Eng.) Silk, D. B. A.; Kim, Y. S. (Veterans
min. Hosp., San Francisco, CA 94121). *J. Physiol.*
ondon) 258(2):489-497; 1976.

testinal segments from female Wistar rats were
cubated in isotonic saline *in vitro* and release
peptidase hydrolase enzymes into the incubation
dia was examined over a 90-min study period.
says of chemical activities were performed and
analysis was made of electrophoretic mobilities
released enzymes on starch gel. The dipeptides
ycyl-L-phenylalanine (Gly-Phe) and L-phenylalanyl-
ycine (Phe-Gly) were chosen as substrates for
termining peptide hydrolase activity. Release of Gly-Phe and Phe-Gly hydrolase activity into saline media maintained at 0-4 and 37 C was linear with respect to time. The media contained much greater amounts of Gly-Phe hydrolase activity than Phe-Gly hydrolase activity. Similar proportions of intestinal mucosal Gly-Phe (18.3) and Phe-Gly (15.1%) hydrolase activities were released into saline media maintained at 0-4 C. In contrast, a significantly higher proportion of intestinal mucosal Gly-Phe (14.5 ± 4.3%) than Phe-Gly (7.5 ± 1.9%) hydrolase activity was released into saline media maintained at 37 C ($p<0.05$). The bulk of enzyme activity (>83.9%) released into saline maintained at 0-4 and 37 C was sensitive to *p*-hydroxymercuribenzoate (9.5 mM). The results of zymogram studies taken in conjunction with the chemical assay data indicate that peptide hydrolases released from intact intestinal tissue *in vitro* originate from the cytoplasm of mucosal cells rather than from the brush border. It is concluded that compared to the *in vivo* situation, cytoplasmic peptide hydrolases are released from intestinal tissue very rapidly *in vitro*.

2470 PROSTAGLANDIN PRODUCTION BY RABBIT ISOLATED JEJUNUM AND ITS RELATIONSHIP TO THE INHERENT TONE OF THE PREPARATION.

(Eng.) Ferreira, S. H.; Herman, A. G.; Vane, J. R. (Faculdade de Medicina, Ribeirao Preto, S.P., Brazil). *Br. J. Pharmacol.* 56(4):469-477; 1976.

Prostaglandin release was studied in isolated rabbit jejunum in which muscle tone was changed by several procedures. Preparations bathed in Krebs solution at 37 C in an isolated organ bath maintained a continuous submaximal muscle contraction, referred to as inherent "tone." Prostaglandins E_2 and $F_{2\alpha}$ were continuously generated by the intestine and released into the bathing fluid. The amounts released first declined over 2 hr and then steadily increased. The release was also greater after 48 hr storage at 4 C and after mechanical damage. There was no change in prostaglandin release when the jejunum was contracted by acetylcholine or physostigmine or relaxed by adrenalin hyoscine, papaverine, dinitrophenol, or calcium-free Krebs solution. Addition to the bathing fluid of the prostaglandin precursor, arachidonic acid, did not increase the release of prostaglandins although it contracted the tissue. Thus, output of prostaglandins from the tissue was not limited by substrate concentration but more probably by the capacity of the prostaglandin synthetase. Indomethacin treatment or bubbling the bathing fluid with N_2 (instead of O_2) decreased or abolished prostaglandin formation and was accompanied by loss of tone of the isolated preparation. Rabbit jejunum stored in Krebs solution containing indomethacin initially released little or no prostaglandin into the bathing fluid. However, prostaglandin release increased with repeated washing of the preparation. The results suggest that intramural prostaglandin production contributes to the inherent tone of the rabbit jejunum, that trauma increases prostaglandin production, and that the inhibitory effects of anoxia are linked with the lack of prostaglandin production and activity.

2471 PROSTAGLANDIN E IN CHOLERA TOXIN-INDUCED INTESTINAL SECRETION: LACK OF AN INTERMEDIARY ROLE. (Eng.) Hudson, N.; El Hindi, S.; Wilson, D. E.; Poppe, L. (Duke Univ., Medical Center, Durham, NC). *Am. J. Dig. Dis.* 20(11):1035-1039; 1975.

The suggestion that prostaglandin E (PGE) may mediate cholera-toxin effects was investigated. Closed jejunal loops in New Zealand rabbits were injected *in vivo* with 2 cm^3 of isotonic phosphate buffer containing 10 $\mu g/cm^3$ of purified cholera toxin and were compared to similar loops in the same animal injected with buffer. Preliminary studies indicated that 20 μg of cholera toxin produced the greatest volume of fluid secretion at 4 hr; this dosage was used throughout the study. Loop mucosal homogenates and intestinal secretions were analyzed by radioimmunoassay for cyclic AMP (cAMP) and PGE concentrations. Cholera toxin produced significant increases in mucosal and intestinal fluid cAMP at 2 and 4 hr; however, there were no significant increases in PGE in the toxin-treated loops when compared to the control loops. In addition, there was no correlation between cAMP and PGE in the same samples. These studies indicate that cholera toxin stimulates intestinal cAMP and secretion independent of PGE synthesis, and provide evidence against a specific role for PGE in mediating cholera-toxin effects.

2472 EFFECTS OF PREDNISOLONE ON THE SMALL INTESTINAL MUCOSA OF THE RAT. (Eng.) Batt, R. M.; Peters, T. J. (Royal Postgraduate Medical Sch., Du Cane Road, London W12 OHS, England). *Clin. Sci. Mol. Med.* 50(6):511-523; 1976.

The effects of prednisolone [1.55 μmol (0.75 mg)/kg body weight, 7 days] on mucosal function, enzymology, lysosomal membrane fragility, morphology, and cell kinetics were examined in proximal jejunum and distal ileum of male Wistar rats. Intestinal function was assessed by examining the kinetics of D-galactose absorption *in vivo* in 30-cm segments of proximal jejunum and distal ileum with a recirculation perfusion apparatus. The maximal absorptive capacity for galactose was significantly greater in both the jejunum and the ileum of the steroid treated animals. This was due to an increase in carrier-mediated transport in the individual enterocytes and not to a change in the cell population. The Michaelis constant for galactose was not significantly altered by prednisolone. The activities of three brush border enzymes (leucyl-beta-naphthylamidase, neutral α-glucosidase, and β-glucosidase) and one basal lateral membrane enzyme (5'-nucleotidase) in isolated enterocyte preparations were increased in isolated enterocyte preparations from the jejunum and ileum of the steroid group. Lysosomal membrane fragility was unaltered in the prednisolone-treated group. Morphometrical observations confirmed that the size of the enterocyte population was unaltered by prednisolone. Studies on cell kinetics indicate that the effects of prednisolone are due to a direct action on the enterocyte and not to secondary changes in migration rate. It is concluded that the main site of prednisolone action appears to be the brush border, where there are increases in absorptive function and in enzyme activities, although there are changes in other organelles such as the mitochondria.

2473 THE EFFECT OF INTESTINAL DISTENSION AND OF SECTION THICKNESS ON COUNTS OF EPITHELIAL NUCLEI IN THE RAT SMALL INTESTINE. (Eng.) Clarke, R. M. (Dept Human Morphology, University Park, Nottingham NG7 2RD, England). *J. Microsc. (Oxf.)* 103(3):333-341; 1975.

A no-overlap method for counting the number of epithelial nuclei in a section of male Wistar rat intestinal villus is described. The number of counts was independent of section thickness over the range of 4-10 μm. Nuclei counts were determined in villi and crypts of rat small intestine, which were fixed either in the collapsed state or were distended by a hydrostatic pressure of 350 mm of water. There was no significant difference between the number of nuclei in these two conditions. Distension reduced the absolute height of the villi ($p<0.025$) and increased their absolute width at the base ($p<0.01$). Absolute crypt depth was unaffected. This technique may be used to discover the relation between nuclear counts of villus height and base width and the total epithelial cell population of a villus. It may also be useful for determining the relation between absolute measurements of villus height and base width and total surface area.

2474 OXIDATIVE METABOLISM OF FOREIGN COMPOUNDS IN RAT SMALL INTESTINE: CELLULAR LOCALIZATION AND DEPENDENCE ON DIETARY IRON. (Eng.) Hoensch, H.; Woo, C. H.; Raffin, S. B.; Schmid, R. (Gastroenterology Unit, Univ. Tubingen, Tubingen, W. Germany). *Gastroenterology* 70(6):1063-1070; 1976.

The effects of dietary iron on intestinal cytochrome P-450 content and oxidative metabolism of foreign compounds was measured in the intestinal mucosa of male rats. Activities of benzpyrene hydroxylase, *p*-nitroanisole *O*-demethylase, and NADPH-cytochrome P-450 reductase and cytochrome P-450 content were 3 to 10 times higher in epithelial cells of the upper villus than in mucosal crypt cells. Villous tip cells of the upper small intestine exhibited much higher cytochrome P-450 content and drug-metabolizing enzyme activity than did tip cells of lower intestinal segments. In rats fed commercial chow diet, cytochrome P-450 content and drug-metabolizing enzyme activity in villous tip cells of duodenal mucosa were higher than in animals fed a semisynthetic diet, but cytochrome b_5 and NADPH-cytochrome P-450 reductase were unaffected. On restriction of dietary iron intake, cytochrome P-450 and oxidative enzyme activity fell sharply, but were completely restored in 24 hr by p.o. iron supplementation, whereas parenteral iron administration was ineffective. These findings suggest that intestinal drug metabolism is localized primarily in the upper villous cells of the proximal intestinal mucosa, that cytochrome P-450 is synthesized in maturing epithelial cells as they migrate from the crypts to the tip of the mucosal villi, and that this process is dependent upon absorption of iron from the intestinal lumen.

2475 STUDY OF MEMBRANOUS DIGESTION AND RESORPTION BY JEJUNAL PERFUSION. (Rus.) Parfenov, A. I.; Zhgun, A. A.; Surnin, Yu. N.; Vasil'ev, V. V.; Klimova, Iu. I.; Svetliakova, T. A.; Miroshnichenko, G. T.; Gerasimov, G. M. (N. N. Burdenko Principal Military Hosp., Moscow, USSR). *Klin. Med.* 53(10):37-42; 1975.

2476 AMYLOLYTIC AND PROTEOLYTIC ACTIVITY OF THE CONTENT AND JUICE IN THE SMALL INTESTINE. (Ukr.) Skorodins'kii, Z. P.; Stoianovs'kii, V. G. (Ukrainian Inst. Physiology and Biochemistry of Domestic Animals, Lvov, USSR). *Fiziol. Zh.* 21(5): 685-686; 1975.

2477 MECHANICAL AND METABOLIC EFFECTS OF β-RECEPTOR STIMULATORS, THE C-TERMINAL OCTAPEPTIDE OF CHOLECYSTOKININ, AND PROSTAGLANDIN E_2 ON THE ISOLATED, DEPOLARIZED SPHINCTER OF ODDI. (Eng.) Andersson, K. -E.; Andersson, R.; Hedner, P.; Persson, C. G. A. (Dept. Pharmacology, Univ. Lund, Lund, Sweden). *Acta Physiol. Scand.* 96(4): 495-499; 1976.

2478 A NEW IRON-BINDING PROTEIN ISOLATED FROM INTESTINAL MUCOSA. (Eng.) Pollack, S.; Lasky, F. D. (Albert Einstein Coll. Medicine, 1300 Morris Park Ave., Bronx, NY 10461). *J. Lab. Clin. Med.* 87(4):670-679; 1976.

2479 THE EFFECT OF FOOD STIMULI OF DIFFERENT QUALITIES AND pH CHANGES IN THE DUODENAL CONTENTS ON THE ACID-FORMING FUNCTION OF THE STOMACH. (Rus.) Matrosova, E. M.; Komarov, F. I.; Shchedrunov, V. V. (I. P. Pavlov Inst. of Physiology, USSR Acad. Sciences, USSR). *Vopr. Pitan.* (3): 58-61; 1975.

2480 INTESTINAL PEPTIDASE ACTIVITY FOLLOWING WHOLE-BODY IRRADIATION IN MICE. (Eng.) Bounous, G.; Hugon, J.; Bastin, E. (Unite de recherche gastrointestinale, Univ. Sherbrooke, Sherbrooke, Quebec, Canada). *Int. J. Clin. Pharm. Biopharm.* 13(2):144-149; 1976.

2481 EFFECT OF THE LIGATION OF THE PANCREATIC DUCT ON THE INTESTINAL pH IN THE RABBIT. (Fre.) Catala, J. (Universite Paul-Sabatier, Institut de Physiologie, 2, rue Francois-Magendie, 31400 Toulouse, France). *C. R. Acad. Sci.* [D] *(Paris)* 281(24):1991-1993; 1975.

2482 THE EFFECT OF EXTENSIVE SMALL INTESTINE RESECTION ON THE ENTEROCHROMAFFIN CELLS IN THE REMAINING INTESTINAL LOOP. (Pol.) Drews, M.; Gawronski, M. (Instytut Chirurgii, 60-355 Poznan, ul. Przybyszewskiego 49, Poland). *Pol. Przegl. Chir.* 47(5):599-604; 1975.

See also, 2315, 2316, 2326, 2331, 2332, 2363, 2366, 2381, 2403, 2485, 2995.

GENERAL

2483 PROLIFERATIVE KINETICS OF LARGE AND SMALL INTRAEPITHELIAL LYMPHOCYTES IN THE SMALL INTESTINE OF THE MOUSE. (Eng.) Ropke, C.; Everett, N. B. (Dept. Biological Structure, Univ. Washington, Seattle, WA). *Am. J. Anat.* 145(3):395-408; 1976.

The proliferative kinetics of intestinal intraepithelial lymphocytes (IL) were evaluated in BALB/C mice. By inducing mitotic arrest, large IL, constituting about 50% of the IL, showed a mitotic rate of 2.3. Autoradiographic results obtained after two different schedules of ^{3}H-thymidine injections showed that 30% of the large IL were in DNA synthesis, and that the large IL were renewed at a rate comparable to that of blast cells from Peyer's patches, mesenteric lymph nodes, and thoracic duct lymph. The small IL were renewed very rapidly compared to small lymphocytes of peripheral lymphoid tissues, although small lymphocytes with life spans of several weeks were also present in the epithelial sheet. By the use of intestinal perfusion, *in vivo*, it was estimated that the loss of lymphocytes from intestinal villi into the lumen of the gut was negligible. It is concluded that the most probable kinetic model for the majority of IL is: B and T lymphoblasts invade the epithelium and undergo mitosis. B lymphoblasts give rise predominantly to plasma cells, and T lymphoblasts give rise to small lymphocytes, probably long-lived, that re-enter the circulation.

2484 KINETICS OF INTRAEPITHELIAL LYMPHOCYTES IN THE SMALL INTESTINE OF THYMUS-DEPRIVED MICE AND ANTIGEN-DEPRIVED MICE. (Eng.) Ropke, C.; Everett, N. B. (Anatomy Dept. A, Univ. Copenhagen, Copenhagen, Denmark). *Anat. Rec.* 185(1):101-108; 1976.

The kinetics of intra-epithelial lymphocytes (IL) of the small intestine was studied in various thymus-deprived mice and in antigen-deprived mice by the use of ^{3}H-thymidine injections and radioautography. In thymus-deprived mice--including adult thymectomized, thymectomized and irradiated, neonatally thymectomized, and nude mice--and in germfree mice, decreased numbers of IL were found. The radioautographic results indicated that the remaining IL populations included both newly formed and long-lived lymphoid cells in the same percentages as found in sham-operated controls and normal mice. It is concluded that although the presence of the thymus and the antigen content of the intestine is of importance to the maintenance of the numbers of cells in the lymphoid populations of the intestinal wall, the basic kinetics of these cell populations are preserved in deprived mice.

2485 INHIBITION OF MACROPHAGE MIGRATION BY NORMAL GUINEA PIG INTESTINAL SECRETIONS.

(Eng.) Gadol, N.; Waldman, R. H.; Clem, L. W. (Dept. Immunology, University of Florida, Gainesville, FL 32610). *Proc. Soc. Exp. Biol. Med.* 151(4):654-658; 1976.

Intestinal cultures from Hartley guinea pigs orally immunized with live and heat-killed *Vibrio cholera* organisms were tested to determine whether they could produce macrophage migration inhibiting factor (MIF) in response to *in vitro* stimulation with *Vibrio* antigens. Sections of the small intestine were cultured for 24 hr and the proteins from the culture fluid were concentrated and then fractionated by Sephadex G-100 column chromatography. Two peaks of MIF activity were found; one contained a protein with a molecular weight of 25,000-50,000, which was heat stable at 56 C (30 min), destroyed by boiling for 1 hr, and completely inhibited by epinephrine. The other peak contained proteins with molecular weights above 100,000, which were only 50% inactivated by boiling for 1 hr and were not significantly affected by epinephrine. The characteristics of the low molecular weight protein are similar to those of authentic MIF. The characteristics of the high molecular weight protein resemble those of endotoxin, which could be derived from the bacteria present in the gut. It is suggested that the MIF present in normal intestine secretions may be derived from: T-cells stimulated by bacterial antigens present in the gut, B-cells present in the gut, or rapidly dividing mucosal cells. All of these cells may contribute to the MIF present in the gut.

2486 THE EFFECT OF CHOLECYSTOKININ-PANCREOZYMIN ON CIRCULATING GASTRIN LEVELS IN MAN AND DOG.

(Eng.) Lanciault, G.; Ertan, A.; Adair, L. S.; Brooks, F. P. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA 19174). *Am. J. Dig. Dis.* 21(1): 39-43; 1976.

The effect of endogenous and exogenous cholecystokinin-pancreozymin (CCK) on circulating gastrin levels was studied in 11 human subjects and in 3 mongrel dogs to explain the reason for the observed gastrin stimulation after exogenous CCK administration. In seven human subjects, endogenous CCK release was produced by perfusing the jejunum with a mixture of amino acids (MAA: isoleucine, 11.3 mM; leucine, 17.0 mM; lysine, 13.5 mM; methionine, 5.2 mM; phenylalanine, 6.7 mM; threonine, 10.7 mM; tryptophan, 1.4 mM; and valine, 13.0 mM) at a rate of 11.4 ml/min. The other four subjects received an i.v. infusion of 10% pure GIH-CCK at 0.125 Crick, Harper, and Raper (CHR) U/kg/min. Serum gastrin levels were determined by a double antibody radioimmunoassay (RIA) technique. When the circulating levels of serum gastrin were determined during MAA perfusion, the concentrations were not significantly different from basal levels. However, exogenous CCK produced a fourfold increase in the circulating levels of serum gastrin ($p<0.05$). In one patient who had received exogenous CCK, blood samples were taken for 330 min after the infusion of CCK was stopped; serum gastrin levels returned to basal values 270 min after the infusion was terminated. When GIH-CCK was given by i.v. infusion at 0.125 CHR U/kg/min to dogs for 120 min, serum gastrin levels increased significantly within 30 min. These levels returned to control levels within 15 min after the infusion was terminated. In contrast, the same rate of infusion with cholecystokinin octapeptide (CCK-OP) produced no significant alterations in circulating gastrin levels. Standard RIA dilution curves for GIH-CCK and CCK-OP were compared with human synthetic gastrin I. Although the slope for GIH-CCK was the same as for gastrin I, it required eight times more CCK. The CCK-OP slope was not parallel with the gastrin I; concentrations of 100 pg/ml could not be measured, indicating a lack of sensitivity of the RIA to CCK and demonstrating that the gastrinemic effect is not a cross-reaction between the CCK and the gastrin antibody used in the RIA. It is concluded that, because GIH-CCK is only 10% pure, and because it is known to contain other polypeptides (i.e., gastrin, gastrin inhibitory polypeptide, and possibly vasoactive polypeptide), the gastrinemic response of exogenous CCK is probably due to an impurity in the CCK preparation. Therefore, when studying the effects of CCK on the gastrointestinal tract only the pure CCK or the octapeptide should be used.

2487 EFFECT OF BILATERAL NEPHRECTOMY ON SERUM GASTRIN CONCENTRATION, GASTRIC HISTAMINE CONTENT, HISTIDINE DECARBOXYLASE ACTIVITY, AND ACID SECRETION IN THE RAT.

(Eng.) El Munshid, H. A.; Liedberg, G.; Rehfeld, J. F.; Sundler, F.; Larsson, L. I.; Hakanson, R. (Dept. Pharmacology, Univ. Lund, Lund, Sweden). *Scand. J. Gastroenterol.* 11(1):87-91; 1976.

The effect of nephrectomy on gastric histamine content, histidine decarboxylase activity, acid secretion, and serum gastrin concentration was studied in 72 male Wistar rats. Nephrectomy caused increased basal acid output in only two of seven rats. In two rats, the acid output was greatly reduced. Nephrectomy abolished the stimulation of acid secretion produced in six rats by pentagastrin (1 mg/kg, s.c.) but it did not abolish that produced by histamine dihydrochloride (25 mg/kg, s.c.) in five rats. Following nephrectomy, the concentration of serum gastrin increased over 10-fold; in eight rats antrectomized 2 weeks before nephrectomy, the gastrin level was raised about 3-fold. There was an almost 20-fol increase in histidine decarboxylase activity following nephrectomy, in the rats with an intact stomach and a 5-fold increase in the antrectomized animals. Treatment with pentagastrin did not raise the enzyme activity (250 pmol CO_2/mg/hr ± 35, compared to 214 ± 10 in nephrectomized controls). In non-nephrectomized, sham-operated animals, pentagastrin raised the enzyme activity (21 ± 2.2, compared with 6.0 in controls). The gastric histamine concentration was reduced 25% by nephrectomy. Pentagastrin reduced the histamine content in sham-operated rats (from 60.4 μg ± 2.4 to 45.2 ± 3.0, 1 hr after operation), but it failed to do so after nephrectomy. In antrectomized rats, the concentration of histamine was much lower than in sham-operated animals. Nephrectomy did not reduce the gastric histamine content further. The results suggest that the kidney is important for metabolism and excretion, not only of gastrin, but of humoral antagonists of gastrin-induced acid secretion as well.

2488 EFFECTS OF PORTACAVAL ANASTOMOSIS ON GLUCOSE TOLERANCE IN THE DOG: EVIDENCE OF AN INTERACTION BETWEEN THE GUT AND THE LIVER IN ORAL GLUCOSE DISPOSAL. (Eng.) Lickley, H. L. A.; Chisholm, D. J.; Rabinovitch, A.; Wexler, M.; Dupre, J. (#937, Women's Coll. Hosp., 76 Grenville St., Toronto, Canada M5S 1B2). *Metabolism* 24(10):1157-1168; 1975.

The importance of the portal route of entry in the determination of glucose tolerance was assessed in healthy dogs. Continuous infusions of glucose (27 or 13.5 g/90 min) were administered in the duodenum (i.d.), or the portal vein (i.p.), or a peripheral vein (i.v.) in conscious dogs, intact dogs, or dogs with portacaval anastomoses. In intact animals, i.d. glucose tolerance was better than i.v. glucose tolerance, but i.p. glucose tolerance was not significantly different from i.v. glucose tolerance. Thus, the superiority of tolerance to i.d. glucose was not accounted for by relatively high levels of glucose in portal blood. Glucose tolerance (i.v.) was not significantly affected by portacaval anastomosis with ligation of the portal vein, but i.d. glucose tolerance was markedly impaired. Disproportionate impairment in tolerance to enterically administered glucose in dogs with portacaval shunts, and the similarity of i.p. and i.v. glucose tolerance in intact dogs, suggest that both the liver and the gut are important in determining oral glucose tolerance through mechanisms that have little or no effect on responses to parenterally administered glucose. The results also suggest that the hepatic contribution is not dependent upon portal venous perfusion of the liver, and that a humoral interaction between the gut and the liver is involved, which is not simply dependent upon endocrine responses of the pancreas.

2489 BLOOD SUPPLY OF THE RECTO-ANAL SEGMENT. (Eng.) Chiampo, L. (Istituto di Patologia Chirurgica, Universita Parma, Parma, Italy). *Abdom. Surg.* 18(3):62; 1976.

2490 X CHROMOSOME-LINKED DEFECT OF CBA/HN MICE IN PRODUCTION OF TUMOR-REACTIVE NATURALLY OCCURRING IgM ANTIBODIES. (Eng.) Martin, S. E.; Martin, W. J. (Natl. Cancer Inst., Bethesda, MD 20014). *J. Immunol.* 115(2):502-507; 1975.

2491 HYPERSENSITIVITY REACTIONS IN THE SMALL INTESTINE: 2. EFFECTS OF ALLOGRAFT REJECTION ON MUCOSAL ARCHITECTURE AND LYMPHOID CELL INFILTRATE. (Eng.) MacDonald, T. T.; Ferguson, A. (Dept. Bacteriology, Univ. Glasgow, Glasgow G11 6NT, Scotland). *Gut* 17(2):81-91; 1976.

2492 THE INFLUENCE OF THE GUT MICROFLORA ON THE NUTRITION OF ITS HOST. (Eng.) Coates, M. E. (Natl. Inst. Res. in Dairying, Shinfield, Reading, Berkshire, RG2 9AT, England). *Bibl. Nutr. Dieta* (22):101-108; 1975.

2493 PENTAERYTHRITOL TETRANITRATE METABOLISM: A NON-ESSENTIAL ROLE FOR THE FLORA. (Eng.) Carter, J. H.; Goldman, P. (Harvard Medical Sch., Beth Israel Hosp., Boston, MA 02215). *Biochem. Pharmacol.* 25:860-862; 1976.

2494 BINDING OF CHOLERA TOXIN BY VARIOUS TISSUES. (Eng.) Gascoyne, N.; van Heyningen, W. E. (Sir William Dunn Sch. Pathology, Univ. Oxford, Oxford OX1 3RE, England). *Infect. Immun.* 12(3):466-469; 1975.

2495 DIRECT EFFECT OF ENDOTOXIN ON THE GASTRIC MUCOSAL MICROCIRCULATION AND ELECTRICAL GRADIENT. (Eng.) Cheung, L. Y.; Reese, R. S.; Moody, F. G. (Univ. Utah Coll. Medicine, Salt Lake City, UT 84132). *Surgery* 79(5):564-568; 1976.

2496 INTESTINAL ANAPHYLAXIS IN THE RAT AS A MODEL OF FOOD ALLERGY. (Eng.) Byars, N. E.; Ferraresi, R. W. (Dept. Inflammation Immune Response, Syntex Res., 3401 Hillview Ave., Palo Alto, CA 94304). *Chir. Exp. Immunol.* 24(2):352-356; 1976.

2497 THE SIGNIFICANCE OF THE ILEOCECAL VALVE IN MASSIVE RESECTION OF THE GUT IN PUPPIES. (Eng.) Reid, I. S. (Children's Medical Res. Foundation, P.O. Box 61, Camperdown, N.S.W. 2050, Australia). *J. Pediatr. Surg.* 10(4):507-510; 1975.

2498 COMPARATIVE EVALUATION OF PANCREAS TRANSPLANTATION TECHNIQUES. (Eng.) Toledo-Pereyra, L. H.; Castellanos, J.; Lampe, E. W.; Lillehei, R. C.; Najarian, J. S. (Dept. Surgery, Univ. Minnesota, Minneapolis, MN 55455). *Ann. Surg.* 182(5):567-571; 1975.

See also, 2318, 2378, 2480, 2768.

DIAGNOSTIC PROCEDURES

2499 CYTOPATHOLOGY OF INTRA-HEPATIC BILE AS COMPONENT OF INTEGRATED PROCEDURE ("MINI-LAP") FOR HEPATOBILIARY DISORDERS. (Eng.) Wertlake, P. T.; Del Guercio, L. R. M. (Veterans Admin. Hosp., Sepulveda, CA 91343). *Acta Cytol.* 20(1):42-45; 1976.

The diagnostic effectiveness of cytologic study of bile as a convenient and inexpensive adjunct to an integrated procedure ("minilap") for hepatobiliary disorders was evaluated in 20 patients. Bile samples were obtained from intrahepatic bile ducts as a simple additional step in the performance of open transhepatic cholangiography. Six patients were determined to have adenocarcinoma; the tumors occurred in the head of the pancreas in four, in the ampulla of Vater in one, and in the biliary ducts in one. The presence of metastatic adenocarcinoma was demonstrated by bile cytology and liver biopsy in three of these patients. Metastatic adenocarcinoma was demonstrated in two patients by bile cytology, whereas the liver biopsies were negative. Primary adenocarcinoma of the head of the pancreas was demonstrated by pancreatic biopsy of one patient. Bile cytology was negative in this patient. The remaining 14 patients were free of cancer. This study indicates that cytologic evaluation of intrahepatic bile is a valuable adjunct to the minilap procedure for the resolution of puzzling cases of hepatobiliary disease.

2500 QUANTITATIVE MEASUREMENT OF LACTOSE ABSORPTION. (Eng.) Bond, J. H.; Levitt, M. D. (Veterans Admin. Hosp., 54th St. and 48th Ave. South, Minneapolis, MN 55417). *Gastroenterology* 70(6):1058-1062; 1976.

Lactose absorption was determined in four normal and in six lactase-deficient subjects by three indirect methods. These involved: (1) measurement of pulmonary hydrogen excretion, (2) pulmonary $^{14}CO_2$ excretion, and (3) stool ^{14}C excretion after ingestion of 12.5 g of 1-^{14}C-lactose and 4 g of polyethylene glycol (PEG). The results were compared with absorption determined directly from the ^{14}C:PEG ratio of multiple terminal ileal aspirates. The fraction of lactose not absorbed, as determined by ileal aspiration, was 0-8% in normals and 42-75% in milk-intolerant subjects. Whereas all three indirect methods were useful in qualitatively separating normal from deficient subjects, the quantity of lactose absorbed, as determined by H_2 excretion, correlated most closely with ileal measurements (r=0.94). Pulmonary $^{14}CO_2$ excretion for 24 hr after ^{14}C-lactose ingestion did not distinguish normal (17 ± 4% of ingested ^{14}C/24 hr) from lactase-deficient subjects (21.1 ± 3%). Likewise, stool ^{14}C:PEG ratios grossly underestimated malabsorption with less than one-fourth of the nonabsorbed ^{14}C appearing in the stool. This suggests that individual differences in susceptibility to diarrhea after milk ingestion by lactase-deficient subjects may be due to differences in the quantity of lactose not absorbed and/or differences in the rate of bacterial metabolism of lactose in the colon. Analysis of ileal fluid collected during passage of the lactose meal indicated that about two-thirds of the osmotic load entering the colon consists of endogenous electrolytes. Thus, the water load delivered to the colon is about three times the amount calculated to be osmotically held by the nonabsorbed sugar.

2501 RADIOIMMUNOASSAY OF BILE ACIDS IN SERUM. (Eng.) Demers, L. M.; Hepner, G. (M. S. Hershey Medical Center, Pennsylvania State Univ., Hershey, PA 17033). *Clin. Chem.* 22(5):602-606; 1976.

Highly specific radioimmunoassay procedures were developed for the determination of glycine conjugated bile acids in the serum of patients with liver disease. Antibodies to two primary bile acids, cholylglycine and chenodeoxycholylglycine, and to two secondary bile acids, sulfolithocholylglycine and deoxycholylglycine, were raised in New Zealand rabbits after the acids were covalently linked to albumin by use of the carbodiimide reaction. Tubes were prepared consisting of acid standards, radiolabeled bile acids, antisera, and patients' sera. The tubes were allowed to equilibrate and diluted normal rabbit serum, free of bile acids, was added to each tube. Antibody-bound and free bile acids were separated by ammonium sulfate; they were then centrifuged, decanted, and the radioactivity was determined. As little as 10 pmol of standard bile acid displaced significant amounts of tracer at an antibody titer binding 50% of labeled hormone. The standard curve range was set at 10-80 pmol. Recovery and parallelism studies were performed with each assay to validate the individual bile acid radioimmunassay. The clinical revelance of individual bile acids was estimated by determining the individual bile acids in the serum of patients with various states of hepatobiliary disease. It is concluded that the concentration of bile acids in serum is increased in various states of liver disease and its measurement appears to be an extremely sensitive indicator of liver function.

2502 THE VALUE OF THE FATTY ACID MEAL IN ORAL CHOLECYSTOGRAPHY. (Eng.) Laufer, I.; Gle hill, L. (McMaster Univ. Medical Center, Hamilton, Ontario, Canada L8S 4J9). *Radiology* 114(3):525-527; 1975.

The value of the fatty acid meal in oral cholecystography was estimated in 231 patients by comparing th radiological diagnoses on fluoroscopic spot films before and after fatty meals. Findings were abnormal in 84 patients. Only one case was diagnosed differently after the meal; a small solitary gallstone was not appreciated before the meal, although it was seen clearly on the post-fat film when the gallbladder was contracted and free of overlying colonic gas. In four other patients, the meal was useful in confirming a probable diagnosis. Three had adenomyomatosis, and in the fourth patien a solitary filling defect in the gallbladder did no move with changes in the patient's position. Howev the post-fat film showed the defect in a different position, indicating that it was a stone rather tha a polyp. It is suggested that fluoroscopic compression spot films be obtained first and that fatty meal be administered if indications still exist. Indications for using a fatty meal include overlying gas shadows, differentiation of a stone from a polyp, adenomyomatosis, distended gallbladder, and suspected common bile duct obstruction. It is estimated that less than 10% of patients should require a fatty meal.

2503 CORRELATION OF ENDOSCOPY AND DOUBLE-CONTRAST RADIOGRAPHY IN THE EARLY STAGES OF ULCERATIVE AND GRANULOMATOUS COLITIS. (Eng.) Laufer, I.; Mullens, J. E.; Hamilton, J. (McMaster Univ. Medical Center, Hamilton, Ontario, Canada L8S 4J9). *Radiology* 118(1):1-5; 1976.

The results of double-contrast radiographic examinations in 90 patients with inflammatory bowel disease were analyzed and compared with those of endoscopic studies during the early stages of disease. The importance of certain technical aspects of the double-contrast study is stressed: bowel cleansing, choice of barium preparation, and patient rotation. The earliest detectable abnormality on the double-contrast study for ulcerative colitis was a fine granular appearance of the mucosa. Superficial ulcers or erosions appeared as the disease progressed; endoscopically, these were seen as tiny bleeding points, and on double-contrast study, barium adhered to these ulcers, resulting in a stippled mucosal pattern. The early lesions of granulomatous colitis, which were seen endoscopically as multiple small, superficial ulcers with intervening normal mucosa, were readily detected by double-contrast study as tiny collections of barium, and in some cases they were surrounded by a radiolucent halo (due to edema). The radiological and endoscopic findings were in agreement in 95% of the cases. Because of the double-contrast study's value in detecting early disease and in clarifying the differential diagnosis in granulomatous colitis, it is suggested that colonoscopy not be performed in patients with inflammatory bowel disease.

2504 USE OF ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY IN THE DIAGNOSIS OF PANCREATIC FISTULA: A CASE REPORT AND REVIEW OF THE LITERATURE. (Eng.) Bohlman, T. W.; Katon, R. M.; Lee, T. G.; Eidemiller, L. R. (Univ. Oregon Health Sciences Center, 3181 S.W. Sam Jackson Park Rd., Portland, OR 97201). *Gastroenterology* 70(4):582-584; 1976.

The case report of a 43-yr-old man with pancreaticocolonic fistula is presented. The man presented with melena, hematochezia, and dizziness. Endoscopic retrograde cholangiopancreatography (ERCP) revealed the cause of the gastrointestinal bleeding; a fistulous tract was seen to pass inferiorly from the tail of the pancreatic duct to the region of the left colon. There was opacification of a cystic cavity and opacification of the colon in the splenic flexure region, establishing the diagnosis of a fistula. Abdominal exploration further revealed the presence of a cystic inflammatory mass applied to the posterior/inferior surface of the pancreas, the medial surfaces of the spleen, and the left side of the transverse colon. The colon was repaired, and caudal drainage of the fistulous tract and pancreatic duct, splenectomy, cholecystectomy, and removal of the tail of the pancreas were undertaken, with successful results. It is concluded that ERCP is a valuable tool for the pre-operative evaluation of patients who are suspected of having communication with the gastrointestinal tract.

2505 CHOLEDOCHAL CYST DEMONSTRATED BY DRIP INFUSION CHOLANGIOGRAPHY, REPORT OF SIX CASES IN ADULTS. (Eng.) Yamasaki, M. (Niigata Univ., Sch. Medicine, Niigata, Japan). *Acta Med. Biol.* 23(1):23-33; 1975.

The use of drip infusion cholecystocholangiography and tomography in the positive diagnosis of a choledochal cyst is discussed and illustrated in case studies of six adults. Oral cholecystographic study usually failed to demonstrate a gallbladder shadow when the cyst was large; intravenous or infusion cholangiography was necessary to demonstrate the condition. In the absence of jaundice, i.v. cholangiography was necessary to demonstrate the condition, and i.v. cholecystocholangiography usually provided adequate visualization of the biliary tree for diagnosis. The rate of positive diagnosis was increased by demonstrating the dilated common duct pre-operatively, following administration by the drip infusion method. In drip infusion cholecystocholangiography, the gallbladder and bile ducts were demonstrated simultaneously usually 90-120 min following the injection. The reliability of biliary tract opacification is more constant than with the usual injection technique, and there is a higher success rate of bile duct opacification in the presence of jaundice. The density of biliary tract opacification is greater than with the conventional technique, and there is the improved ability to visualize directly the dilated bile duct. There is a possibility of performing tomographic studies because of the simultaneous, long opacification of the components of the extrabiliary system. The superiority of this method using tomography or planigraphy is stressed.

2506 ENDOSCOPY-RELATED BACTEREMIA. INCIDENCE OF POSITIVE BLOOD CULTURES AFTER ENDOSCOPY OF UPPER GASTROINTESTINAL TRACT. (Eng.) Mellow, M. H.; Lewis, R. J. (Harlem Hosp. Center, 136th St. and Lenox Ave, New York, NY 10037). *Arch. Intern. Med.* 136(6):667-669; 1976.

The incidence of endoscopy-related bacteremia of the upper gastrointestinal tract was investigated in 100 patients, in a prospective study. Three patients showed positive blood cultures, after the endoscopy procedure. Cultures were made of samples from equipment and environment in the operating room. Bacillus species, *Micrococcus*, *Staphylococcus epidermidis*, and diphtheroids were most frequently cultured from the environment. There was also one case of *Enterobacter liquefaciens* and *Candida albicans* growth from the endoscope tip. It is concluded that although the incidence of postendoscopy positive blood cultures was low, a more vigorous approach to using clean equipment in clean surroundings is needed when dealing with a potentially susceptible host. It is suggested that "sterile" be substituted for "clean air" in these procedures.

2507 INTRAMURAL BARIUM IN ISCHEMIC COLITIS: A NEW RADIOGRAPHIC FINDING. (Eng.) Greves, J. H., III; Bohlman, T. W.; Frische, L. H.; Katon, R. M. (Univ. Oregon Medical Sch., 3181 Southwest Sam Jackson Park Road, Portland, OR 97201). *Am. J. Dig. Dis.* 21(3):257-262; 1976.

Two cases of ischemic colitis are presented, demonstrating a new radiographic finding of intramural dissection of barium. The differential diagnosis in these patients included idiopathic ulcerative colitis, granulomatous colitis, infectious colitis, diverticulitis, and ischemic colitis. Stool cultures from both patients were negative for enteric pathogens, and no amebae were seen in stool specimens or in mucosal biopsies. No diverticula were observed on barium enema or colonoscopy in either patient. The rectum and lower sigmoid were free of disease in both patients. Contrast studies of the colon revealed no abscesses, strictures, skip areas, fistulas, cobblestoning, or terminal ileal involvement. The involved segment in both cases was short and limited to the left colon, typical of ischemic colitis. The barium enema examinations, although not characteristic of ischemic colitis, did reveal dissection of barium into the wall of the colon. The presence of barium persisted 3 days following enema administration in one patient, and for 1 week, in the other patient. It is concluded that the persistence of intramural colonic barium in a patient presenting with rectal bleeding of unclear etiology or a nonspecific colitis should suggest the diagnosis of ischemic colitis, even if the more typical roentgenographic changes are lacking.

2508 THE EFFECT OF GLUCAGON ON BARIUM-ENEMA EXAMINATION. (Eng.) Meeroff, J. C.; Jorgens, J.; Isenberg, J. I. (Wadsworth Veterans Admin. Hosp., Los Angeles, CA). *Radiology* 115(1): 5-7; 1975.

Fifty barium enema studies with glucagon and 50 with a placebo were performed in 84 men to determine the effect of glucagon on colonic spasm, patient discomfort, and diagnostic quality. All patients received a low-residue diet for 2 days, followed by 59 ml of castor oil before the examination, and all were fasted overnight. Either glucagon (2 mg/2 ml) or placebo (2 ml) was injected i.m. in a randomized double-blind fashion, 10 min before beginning the enema. The patients who received glucagon showed a highly significant improvement ($p<0.001$); they had increased bowel relaxation, less discomfort, less spasm, and improved radiographic quality, as compared with the placebo group. The placebo group demonstrated a significant increase in mean pulse and mean diastolic blood pressure following the enema ($p<0.05$) but not in mean systolic blood pressure. The authors conclude that glucagon is effective in diminishing the prevalence of colonic spasm, improving radiographic quality, and decreasing patient discomfort during the barium enema examination.

2509 ULTRASONIC SCANNING OF PANCREATIC LESIONS: EFFICACY OF ULTRASONOGRAPHY IN PANCREATIC DISORDERS COMPARED TO ENDOSCOPIC RETROGRADE PANCREATOGRAPHY. (Ger.) Lutz, H.; Petzoldt, R.; Hofmann, K. P.; Rosch, W. (Medizinische Universitats-Klinik, Ultraschallabor, D-8520 Erlangen, West Germany). *Klin. Wochenschr.* 53(9):419-424; 1975.

The diagnostic efficacy of ultrasonography in pancreatic disorders was evaluated by comparing the results of this procedure with the results of endoscopic retrograde pancreatography in 140 patients. In 23 patients, retrograde cannulation of Vaters' papilla was unsuccessful due to a previous Billroth II resection. Examination of the pancreas with ultrasonography was not possible in 20 patients because of meteorism or severe adipositas. In 15 subjects, the sonographic findings were equivocal. Out of 105 ultrasonic findings, 3 were false-negative, and 5 were false-positive, whereas retrograde pancreatography resulted in 9 false-negative and 2 false-positive interpretations. In 50 out of 67 cases of pancreatic disorders diagnosed by ultrasonography, a further differentiation between malignant tumors and benign pseudotumors (pancreatitis or cyst) was possible. Ultrasonography was superior in the diagnosis of pancreatic cysts (23 of 27) as compared with retrograde pancreatography (12 of 27) since many cysts do not communicate with the ductal system. In comparison to the endoscopic method, ultrasonography is safer and less expensive. It is concluded that the two methods supplement each other so that a high diagnostic accuracy can be achieved (over 95%).

2510 MULTIPLE "BULL'S-EYE" LESIONS IN GASTRIC LYMPHOMA. (Eng.) Dunnick, N. R.; Harell, G. S.; Parker, B. R. (Stanford Univ. Sch. Medicine, Stanford, CA 94305). *Am. J. Roentgenol.* 126(5): 965-969; 1976.

Three cases of adolescent patients with multiple gastric target lesions and gastric lymphoma are reported. In addition, 119 cases were reviewed to determine whether multiple gastric target lesions are confined to adolescent patients or to patients with a particular subtype. All patients presented with abdominal pain, nausea, and vomiting. Each had a poorly differentiated or histiocytic lymphoma with disease at other sites. Two patients had lymphoma involving the small bowel as well as the stomach. One patient had multiple small bowel endoexcentric and polypoid intraluminal masses, and in another patient, multiple target lesions were present in the duodenum. The literature review revealed that multiple gastric lymphomatous target lesions are not confined to adolescent patients or to patients with a particular histologic subtype.

2511 EOSINOPHILIC GRANULOCYTES ON THE GASTROCYTOGRAM. (Eng.) Miczban, I. (Municipal Janos Hosp., Polyclinic Budapest, Hungary). *Acta Cytol.* 20(1):32-34; 1976.

The causes and significance of the eosinophilia observed in lavage gastrocytograms of 23 patients with various gastric diseases were examined. Eosinophilia was transitory in nine patients, and it was not found 2 weeks after the initial examination. In these patients the cells of the gastric mucosa were normal, but there was an increase in WBC, interstitial cells, plasmacytes, histiocytes, and macrophages. No eosinophilic granulocytes were observed in blood or sputum. In three patients, a significant and high grade allergic condition was present. Eosinophilic granulocytes were found in gastric juice aspirated from the empty stomach and in the lavage of one of these patients. The second allergic patient had a 10% concentration of eosinophilic granulocytes, while the third patient had 8-15% in the blood and 30% in the gastric smear. In two patients, the accumulation of eosinophilic granulocytes was accompanied by a polyp. The presence of eosinophilic granulocytes was associated with four cases of cancer; of the two in whom operation was possible, one showed scirrhus and the other showed polypoid carcinoma. Eosinophilia was associated with giardia lamblia, gastric ulcer, or gastric ulcer with eosinophilic gastritis in three other cases. The remaining patient was under prolonged gastrocytologic control and had atypical gastric epithelium (large clusters of surface mucosal cells and cytoplasmic vacuolization with goblet cell metaplasia). However, there were no neoplastic changes in the gastric epithelium of this patient. It is suggested that the presence of eosinophils in the gastrocytogram may accompany malignant changes.

2512 VASCULAR IMPRESSIONS OF THE GUT SECONDARY TO CHRONIC VASCULAR OCCLUSIVE DISEASE. (Eng.) Menuck, L.; Coel, M. (Dept. Radiology, Univ. California San Diego, San Diego, CA 92161). *Am. J. Roentgenol.* 126(5):970-973; 1976.

The cases of 12 patients with chronic vascular occlusion involving the gut are discussed. Arteriography revealed that of the eight patients who underwent upper gastrointestinal barium studies, five demonstrated definite contoural defects related to large collaterals. Three of these cases are presented. These patients had discrete extrinsic contoural defects along the medial aspect of the descending duodenum. The presence of contoural defects are useful in the differential diagnosis of vascular occlusion, particularly because of the often vague and nonspecific symptoms. It is concluded that visceral arteriography should be considered in patients whose radiographic examinations reveal these irregularities.

2513 GASTRIC ACID AND SERUM GASTRIN SECRETION BEFORE AND AFTER BYPASS OF THE SMALL INTESTINE FOR MORBID OBESITY. (Eng.) Coutsoftides, T.; Baranowski, J.; Himal, H. S. (Dept. Experimental Surgery, McGill Univ., Montreal, Canada). *Surg. Gynecol. Obstet.* 142(4):521-523; 1976.

Gastric acid output and serum gastrin were measured preoperatively and within 3 months postoperatively in six patients undergoing end-to-side jejuno-ileal bypass for morbid obesity. Meat extract stimulated acid output was higher in obese than in nine normal subjects. Following the bypass procedure, basal and meat extract stimulated acid output significantly decreased. Basal and meat extract stimulated serum gastrin levels did not change following bypass. These studies demonstrate that after a small intestinal bypass, acid output decreases. Gastrin plays no role in this change.

2514 DEMONSTRATION OF BLEEDING FROM MECKEL'S DIVERTICULUM BY MEANS OF SELECTIVE ARTERIOGRAPHY OF THE SUPERIOR MESENTERIC ARTERY. (Eng.) Perlberger, R. R. (Dept. Diagnostic Radiology, Academisch Ziekenhuis, Rotterdam, Netherlands). *Radiol. Clin.* 44(5):397-401; 1975.

The case of a 21-yr-old man with a bleeding Meckel's diverticulum is presented. The patient presented several episodes of rectal bleeding over a 3-yr period, but x-ray examinations of the stomach, duodenum, small intestine, and colon were normal. Angiography of the superior mesenteric artery revealed a wide and tortuous ileal branch, and there was a contrast leak in a major branch of one of the ileal distal arteries. It is suggested that arteriography be performed before other contrast medium studies in cases of lower gastrointestinal bleeding.

2515 ACTIVITIES OF ASPARTATE AND ALANINE AMINOTRANSFERASES AND ALKALINE PHOSPHATASE IN SERA OF HEALTHY SUBJECTS. (Eng.) Penttila, I. M.; Jokela, H. A.; Vitala, A. J.; Heikkinen, E.; Nummi, S.; Pystynen, P.; Saastamoinen, J. (Univ. Central Hosp., Kuopio, Finland). *Scand. J. Clin. Lab. Invest.* 35(3):275-284; 1975.

2516 QUANTITATION OF TUMOR VOLUMES AND RESPONSE TO THERAPY WITH ULTRASOUND B-SCANS. (Eng.) Tolbert, D. D.; Zagzebski, J. A.; Banjavic, R. A.; Wiley, A. L., Jr. (Univ. Wisconsin Hosp., Madison, WI 53706). *Radiology* 113(3):705-708; 1975.

2517 WHAT IS THE PLACE OF UPPER GASTROINTESTINAL FIBERENDOSCOPY IN GASTROENTEROLOGICAL DIAGNOSIS IN 1974? (Fre.) Guerre, J.; Christoforov, B.; Duflo, B.; Chopita, N.; Pequignot, H. (Hopital Cochin, 27, rue Fg Saint-Jacques, 75674 Paris Cedex 14, France). *Entretiens Bichat Med.* 1974: 81-84.

2518 ABDOMINAL ULTRASONOGRAPHY IN A MESENTERIC CYST PRESENTING AS ASCITES. (Eng.) Gordon, M. J.; Sumner, T. E. (David Grant USAF Medical Center, Travis Air Force Base, CA 94535). *Gastroenterology* 69(3):761-764; 1975.

2519 LAPAROSCOPY: COMPLICATIONS AND EVALUATION OF ITS RISKS IN 700 EXAMINATIONS. (Spa.) Del Pozo Camaron, A.; Pajares Garcia, J. M.; Alonso, I. J. (Gran Hospital del Estado, Madrid, Spain). *Rev. Esp. Enf. Apar. Dig.* 47(1):83-92; 1976.

2520 POSSIBILITIES OF ENDOSCOPY OF THE UPPER GASTROINTESTINAL TRACT FOR PREOPERATIVE DIAGNOSIS. (Ger.) Liehr, H. (Medizinische Universitatsklinik, D-87 Wurzburg, Josef-Schneider-Str. 2, W. Germany). *Chirurg* 46(6):245-249; 1975.

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2522 BARIUM EMBOLIZATION FOLLOWING UPPER GASTROINTESTINAL EXAMINATION. (Eng.) Mahboubi, S.; Gohel, V. K.; Dalinka, M. K.; Cho, S. Y. (Thomas Jefferson Univ. Hosp., 11th and Walnut St., Philadelphia, PA 19107). *Radiology* 111(2):301-302; 1974.

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2543 IS DOUBLE-CONTRAST EXAMINATION OF THE COLON THE ONLY ACCEPTABLE RADIOGRAPHIC EXAMINATION? (Eng.) Margulis, A. R. (Dept. Radiol., Univ. California, San Francisco, CA 94143). *Radiology* 119(3):741-743; 1976.

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2552 ELECTROCARDIOGRAPHIC MONITORING DURING COLONOSCOPY [Abstract]. (Eng.) Vawtar, M.; Ruiz, R.; Alaama, A.; Arorow, W. S.; Dagradi, A. E. (Veterans Admin. Hosp., Long Beach, CA). *Gastrointest. Endosc.* 21(4):197; 1975.

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See also, 2397, 2399, 2554, 2584, 2692, 2605, 2685, 2689, 2694, 2709, 2710, 2716, 2760, 2762, 2779, 2806, 2807, 2808, 2848, 2894, 2915, 2933, 2943, 2944, 2945, 2946, 2947, 2959, 2961, 2968, 2982, 2983, 3005, 3037, 3038, 3046.

GASTROINTESTINAL DISEASES

ESOPHAGUS

2554 EFFECT OF PERFUSION OF BILE SALTS SOLUTIONS INTO THE OESOPHAGUS OF HIATAL HERNIA PATIENTS AND CONTROLS. (Eng.) Bachir, G. S.; Collis, J. L. (Birmingham Medical Sch., Birmingham, England). *Thorax* 31(3):271-277; 1976.

The esophageal mucosa of 54 hiatal hernia patients was tested to determine sensitivity to acid and solutions of the bile salt conjugates separately, and in mixtures, in normal saline and acid. Patients were divided into three groups (18 in each group): group I, symptomatic hiatal hernia patients; group II, hiatal hernia patients with peptic stricture; and group III, normal controls. Each esophagus was perfused at a rate of 45-65 drops/min over 25 min with six solutions: normal saline, N/10 HCl, taurine conjugates of bile salts in N/10 HCl, glycine conjugates of bile salts in normal saline, and taurine and glycine conjugates in a ratio of 1:2 in normal saline. Acidified solutions of taurine conjugates were more irritating than acid alone. With a 2 mM/l solution of taurine conjugates in acid, symptoms were produced even in controls. With a 1 mM/l solution of the same conjugates, the majority of controls felt slight heartburn or nothing. The results indicate that perfusion of acidified solutions into the esophagus can be used as a test solution for esophagitis.

2555 THE ASSOCIATION AND EMBRYOGENESIS OF TRACHEO-OESOPHAGEAL AND ANORECTAL ANOMALIES. (Eng.) Piekarski, D. H.; Stephens, F. D. (Royal Children's Hosp., Melbourne 3052, Australia). *Prog. Pediatr. Surg.* 9:63-76; 1976.

Thirty-one patients with combined esophageal and anorectal anomalies comprising 10% of 328 consecutive foregut malformations and 246 anorectal deformities were studied. Twenty-three of the combined group had at least one other associated anomaly. Twenty-three of this series also exhibited at least three of the VATER defects. There was a very high incidence of associated vertebral, urological, and musculoskeletal anomalies. This high incidence of additional lesions is presumably a reflection of generalized early damage to the mesenchymal tissues at the fourth week of gestation. Similar embryological mechanisms may take place and be affected similarly in both foregut and hindgut systems; the concept of a two-component septum dividing the foregut and hindgut is proposed to explain the formation and malformations in these regions. Disturbances of alignment, direction, and extent of these component septa induced by hyperflexion of the foregut and hindgut, and intrinsic septal defects presumably account for most of the malformations. Hyperflexion may also account for malformations of other systems and for the high incidence of associated anomalies in the 31 patients with esophagorectal deformities.

2556 ESOPHAGEAL MONILIASIS: A REVIEW OF COMMON AND LESS FREQUENT CHARACTERISTICS. (Eng.) Lewicki, A. M.; Moore, J. P. (George Washington Univ. Medical Center, Washington, DC 20037). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(1):218-225; 1975.

The clinical and roentgenographic characteristics of esophageal moniliasis are reviewed. Invasion of the esophagus by *Candida albicans* probably occurs more frequently than the reported cases suggest. The disease usually occurs following immunosuppression, but it may occur after antibiotic therapy. In the latter case, it is postulated that the fungi overgrow because they do not have to compete for nutritive substances with the normal bacterial flora that are removed by the antibiotics. Clinical symptoms include sudden onset of severe pain and dysphagia; recovery may occur after 2 days of treatment, or death due to dissemination may result. When the fungi are found in the mycelial form rather than exclusively as yeasts (the latter are found in the mouth and feces of healthy individuals), invasion can be assumed. Roentgenographically, impaired motility is much more prominent than is disordered motility or spasm. The degree of impaired motility directly reflects the severity of esophageal involvement and is usually worse in the distal portion of the esophagus. Esophageal moniliasis probably results from the spread of *Candida albicans* from the oral cavity to the esophagus. Esophagoscopy reveals that the cervical esophagus is involved from the level of the cricopharyngeus, but involvement at the cervical level or in the hypopharynx has not been described roentgenographically. As the disease progresses, compromise of the diameter of the esophageal lumen may occur from both edema of the mucosa and the presence of an overlying pseudomembrane. Morphological characteristics of the disease include a cobblestone epithelium, and later, erosions and ulcerations. Occasionally an asymmetrical, abrupt stenosis due to monilial disease may simulate an infiltrating neoplasm. The most important differential point for distinguishing varices and carcinoma from moniliasis is the striking variability of roentgen findings over a short time period. Antifungal agents are effective in treating moniliasis.

2557 RESECTION OF THE CICATRICIALLY NARROWED ESOPHAGUS WITH SIMULTANEOUS CONSTRUCTION OF THE GASTROESOPHAGEAL ANASTOMOSIS. (Rus.) Valiev, F. G. (Bashkir Medical Inst., Ufa, USSR). *Vestn. Khir.* 115(7):62-65; 1975.

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2563 EXPERIMENTAL EVALUATION OF OESOPHAGEAL MUSCULAR CUFFS IN THE REPAIR OF OESOPHAGEAL DEFECTS. (Eng.) Livaditis, A.; Radberg, L.; Jonsson, L.; Odensjo, G. (Karolinska sjukhuset, Stockholm, Sweden). *Scand. J. Thor. Cardiovasc. Surg.* 9(2):155-161; 1975.

2564 THE LOWER ESOPHAGEAL SPHINCTER: PHYSIOLOGIC AND CLINICAL ASPECTS. (Eng.) Castell, D. O. (U.S. Naval Hosp., Philadelphia, PA). *Ann. Intern. Med.* 83(3):390-401; 1975.

2565 PHYSIOLOGY OF THE LOWER ESOPHAGEAL SPHINCTER. (Eng.) Wright, L. F. (Dept. Medicine, Univ. Alabama, Birmingham, AL). *Ala. J. Med. Sci.* 11(3):193-195; 1974.

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2567 X-RAY DIAGNOSIS OF PATHOLOGICAL CONDITIONS OF THE ARTIFICIAL ESOPHAGUS MADE OF THE LARGE INTESTINE. (Rus.) Rabkin, V. M.; Rozenfel'd, L. G. (All-Union Scientific Res. Inst. Clinical and Experimental Surgery, USSR Ministry of Health, Moscow, USSR). *Vestn. Rentgenol. Radiol.* (2):37-45; 1975.

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2576 AN UNUSUAL CASE OF TRACHEOESOPHAGEAL FISTULA AND ESOPHAGEAL ATRESIA COMPLICATED BY MALROTATION AND A PARTIAL DUODENAL DIAPHRAGM. (Eng.) Boston, V. E.; Wagget, J. (Newcastle Upon Tyne, England). *J. Pediatr. Surg.* 10(5):835-836; 1975.

2577 AORTO-OESOPHAGEAL FISTULA COMPLICATING CARCINOMA OF THE OESOPHAGUS: REVIEW OF THE LITERATURE AND REPORT OF A CASE FOLLOWING IRRADIATION AND CYTOSTATIC THERAPY. (Eng.) Soreide, O.; Janssen, C. W., Jr.; Kvam, G.; Hartveit, F.

(Dept. Surgery, Univ. Bergen, Haukeland Sykehus, 5000 Bergen, Norway). *Scand. J. Thor. Cardiovasc. Surg.* 10(1):79-84; 1976.

2578 BLOOD BEZOAR IN A FEMALE PATIENT WITH VARICOSE DILATATION OF THE ESOPHAGEAL VEINS. (Rus.) Aslanov, T. T.; Allakhverdibekova, A. G. (Scientific Res. Inst. Radiology and Oncology, Ministry Health Azerbaidzhan SSR, Baku, USSR). *Klin. Med.* 53(11):141-142; 1975.

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2580 THE IMPORTANCE OF DYNAMIC FACTORS IN THE PATHOGENESIS OF ESOPHAGEAL DIVERTICULA (ELECTRICAL PRESSURE STUDIES). (Ita.) Latteri, S.; Deodato, G.; Banna, P.; Prestianni, B.; Monello, S. (Istituto di Chirurgia Toracica, dell'Universita di Catania, Catania, Italy). *Acta Chir. Ital.* 30(4):387-398; 1974.

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2584 DIAGNOSIS OF ESOPHAGEAL LESION IN SYSTEMIC SCLERODERMA. (Rus.) Savarovskii, A. I.; Grebeneva, L. S. (Inst. Rheumatology, USSR Acad. Medical Sciences, Moscow, USSR). *Ter. Arkh.* 47(11):121-130; 1975.

See also, 2525, 2526, 2528, 2529, 2610, 3003.

STOMACH

2585 MAST CELLS OF THE HUMAN STOMACH. (Eng.) Steer, H. W. (Radcliffe Infirmary, Oxford, England). *J. Anat.* 121(2):385-397; 1976.

Morphological aspects of mast cell function were studied using biopsy material obtained from four different sites (prepyloric, incisura angularis, high on the lesser curve, and high on the greater curve) of the stomach of 5 normal subjects and 30 patients with gastric ulceration. Light microscopy revealed mast cells in all regions. The cells, stained metachromatically, showed granules with characteristic ultrastructural features, did not possess a basement lamina, and were normally found in connective tissue. Differences were noted between the subepithelial mast cells and the intraepithelial mast cells and a gradation was noted between them. Evidence of degranulation was found in the subepithelial mast cells, but not in the epithelial mast cells. Vacuolation occurred mainly in the epithelial mast cells, but it was present to a limited extent in the subepithelial cells. Subepithelial mast cells contained both orthochromatically and metachromatically stained granules. No granules consisting entirely of a lamellar substructure were noted in epithelial mast cells. Findings indicate that only the lamellar type of granule undergoes degranulation. Metachromatic granules were seen mainly in the subepithelial mast cells using methylene blue-Azur II staining, whereas the metachromasia of the epithelial mast cells was demonstrated principally in the vacuoles. The disappearance of metachromatic granules from the mast cells, which migrated into the gastric epithelium coincided with the disappearance of those granules, which were entirely lamellar in structure. It is considered that the lamellar granules represent the metachromatic granules seen with the light microscope. When granule disintegration with vacuolation becomes complete, the nucleus becomes uniformly electron-dense and the mast cell is shed into the gastric lumen.

2586 LDH ISOENZYME PATTERN OF UNINVOLVED GASTRIC MUCOSA OF PATIENTS WITH GASTRIC CARCINOMA AND BENIGN GASTRIC DISEASE. (Eng.) Woollams, R.; Barratt, P. J.; Orwell, R. L.; Piper, D. W. (Dept. Medicine, Univ. Sydney, Australia). *Digestion* 14(1):20-28; 1976.

The lactate dehydrogenase (LDH) isoenzyme pattern of uninvolved gastric mucosa of patients with gastric cancer, gastric ulcer, and duodenal ulcer was studied and compared. Effects of gastritis and intestinal metaplasia on the LDH isoenzyme pattern re also assessed. The study showed that the M/H tio (M and H subunits) and the (IV + V)/(I + II) d V/I isoenzyme ratios were higher in antral mucosa an in body mucosa in gastric and duodenal ulcer tients as well as in gastric carcinoma patients. e gastric carcinoma group differed significantly om both the gastric and duodenal ulcer groups in e M/H ratio, isoenzyme (IV + V)/(I + II) ratio, and oenzyme V/I ratio of uninvolved body mucosa. Values r the two peptic ulcer groups were similar. Rearding antral mucosa, the gastric cancer group difered from both ulcer group patients with respect to he M/H ratio. The gastric ulcer and gastric cancer roups differed in their (IV + V)/(I + II) and V/I soenzyme ratios, while the duodenal ulcer and gastric ancer groups were similar with regard to these atios. Thus, the rise in M/H ratio associated with astritis was confirmed, but intestinal metaplasia lone did not significantly alter this ratio. Uninolved antral and body mucosa of gastric cancer paients differed from similar mucosa of ulcer patients, he mucosa of cancer patients resembling that usually ound in cancer tissue. These observations are conistent with the concept that the tissue from which he cancer arose may possess a premalignant biochemical lesion.

2587 SUTURE GRANULOMAS SIMULATING TUMORS: A PREVENTABLE POSTGASTRECTOMY COMPLICATION. (Eng.) Gueller, R.; Shapiro, H. A.; Nelson, J. A.; Bush, R. (Veterans Admin. Hosp., San Francisco, CA). *Am. J. Dig. Dis.* 21(3):223-228; 1976.

Four cases of patients with suture granulomas are presented. The patients underwent some form of gastric surgery (gastrojejunostomy, oversewing of perforated pyloroduodenal ulcer, 50% Hoffmeister gastric resection, or antrectomy with Billroth I anastomosis and truncal vagotomy), which involved the use of silk sutures. The patients' symptoms were explained by associated lesions, such as adhesions, suture-line ulcers, erosions, or abscesses--conditions that appeared to be related to nonabsorbable suture material. In all four patients, the differential diagnosis was difficult on the basis of their upper gastrointestinal series, and the granuloma was precisely diagnosed by surgical biopsy. It is suggested that a new absorbable suture material, polyglycolic acid, may eliminate this problem.

2588 INDUCTION OF PYLORIC HYPERTROPHY BY PENTAGASTRIN: AN ANIMAL MODEL FOR INFANTILE HYPERTROPHIC PYLORIC STENOSIS. (Eng.) Dodge, J. A.; Karim, A. A. (Univ. Hosp. Wales, Heath Park, Cardiff, U.K.). *Gut* 17(4):280-284; 1976.

Twenty pregnant bitches and/or their pups were given pentagastrin in depot form to produce an animal model for infantile hypertrophic pyloric stenosis. Two depot forms of pentagastrin were prepared. In one, pentagastrin powder was suspended in an 8% or 10% mixture of beeswax in arachis oil (8 mg pentagastrin/ml). The second preparation used a base of 0.5% phenol and 16% gelatin (8 mg pentagastrin/ml). Fifty-six pups produced by 14 bitches were given 2-4 mg pentagastrin (and in one case 20 mg) twice daily for 1-85 days before term; they were then available for postmortem examination. Sixteen of these pups had pyloric hypertrophy. Nine of the 56 pups had ulcers in the prepyloric region, pyloric canal, or duodenum at necropsy, and perforation occurred in three instances. Within individual litters, some pups had pyloric hypertrophy, while the remainder were normal. Eight additional bitches were similarly treated for 5-49 days, and their 35 pups were given 0.5 to 4 mg of pentagastrin twice daily at birth; the duration of treatment was from 1 to 30 days. Nine pups had pyloric hypertrophy at necropsy, and five had ulcers. In 6 bitches and their 29 offspring, no treatment was given, and none showed any abnormalities on postmortem examination. Similar results were obtained in 4 bitches and their 18 offspring which received injections of beeswax or gelatin without pentagastrin. The histological features of the pylorus in pups showing hypertrophy closely resembled those of the human infant with pyloric stenosis. The circular muscle was hypertrophic. Ganglion cells in the myenteric plexus showed changes in size and configuration compared with controls, and occasional vacuolation was present. Submucosal ganglion cells were absent at the pyloroduodenal junction. The control groups differed significantly ($p<0.01$) from the first two treatment groups with respect to incidence of both pyloric hypertrophy and ulceration. The fact that some pups showed no abnormalities, while others in the same litter showed pyloric hypertrophy suggests that individual inherent susceptibilities are an important determinant of the response; this is similar to the situation in human infantile hypertrophic pyloric stenosis, where genetic and environmental factors apparently interact. In spite of the inconsistency of response, transplacental pentagastrin stimulation of the canine fetus appears to be a valid animal model for infantile pyloric stenosis.

2589 EFFECT OF VAGOTOMY ON THE GASTRIC SECRETORY RESPONSE TO INTRADUODENAL OSMOTIC AGENTS IN MAN. (Eng.) Ward, A. S. (Sheffield Royal Infirmary, Sheffield, England). *Gut* 17(1):48-53; 1976.

The effect of intraduodenal infusion of hypertonic saline and glucose on pentagastrin-stimulated gastric secretion was investigated in 35 normal subjects, 32 duodenal ulcer patients, and 32 patients after truncal vagotomy and pyloroplasty. Gastric secretion was stimulated by a continuous i.v. infusion of pentagastrin (6 μg/kg/hr in normal subjects and pre-operative patients, 9 μg/kg/hr in vagotomized subjects). A significant gastric inhibitory response occurred after 0.51 M saline in 7 of 12 normal subjects tested and in 9 of 12 duodenal ulcer patients ($p<0.01$ and $p<0.001$, resp., resp.). Inhibition of acid output occurred in 11 of 12 normal subjects and in all of 12 tested ulcer patients after 1.03 M glucose infusion ($p<0.001$). Acid output was unchanged in all of 10 vagotomized patients with 1.03 M glucose infusion and in 8 of 10 vagotomized patients with hypertonic saline. Inhibition occurred in all of five normal and in all of four ulcer patients with 2.75 M glucose infusion, and significant inhibition was also seen in four of six vagotomized patients ($p<0.05$). The results suggest that the inhibitory effect of glucose and hypertonic saline depends, at least partially, on a vagal reflex. Since the response to a very high glucose concentration persisted after vagotomy, a humoral mechanism may be involved.

2590 DISACCHARIDASE ACTIVITIES IN INTESTINAL METAPLASIA-CONTRIBUTION OF LYSOSOMAL AND BRUSH BORDER ENZYMES. (Eng.) Gudmand-Hoyer, E.; Asp, N.-G.; Mollmann, K.-M. (Medical Dept. B, Kobenhavns Amts Sygehus i Gentofte, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 10(6):653-656; 1975.

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2592 HEMATEMESIS AND MELENA: ROUTINE EMERGENCY ENDOSCOPY. (Nor.) Rosseland, A.; Gundersen, S. (Telemark Sentralsjukehus, Medicinsk avdeling, Telemark, Norway). *Tidsskr. Nor. Laegeforen.* 95(10):598-601; 1975.

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2594 ULTRASTRUCTURE OF ATROPHIC GASTRITIS INDUCED IN MAN. (Fre.) Rodriguez Olleros, A.; Martinez Palomo, A.; Taveras, J. E.; Febles Vizcarrondo, F. (Sch. Medicine, Univ. Puerto Rico, San Jorge No. 166, Santurce, Puerto Rico 00911). *Med. Chir. Dig.* 3(5):307-312; 1974.

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2598 TREATMENT OF GASTRIC BEZOARS. (Ger.) Nauer, E.; Filippini, L. (Kantonsspital, CH-6000 Luzern, Switzerland). *Dtsch. Med. Wochenschr.* 100(29):1602-1603; 1975.

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2602 GASTRIC RE-IMPLANTATION (TECHNIQUE, FUNCTIONAL AND MORPHOLOGICAL RESULTS). (Rus.) Feofilov, G. L.; Paskal', A. A.; Motsartov, V. D. (Dept. General Surgery, Novosibirsk Medical Inst., Novosibirsk). *Eksp. Khir. Anesteziol.* (2):21-24; 1975.

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2605 RETENTION OF SMALL FOREIGN OBJECTS IN THE STOMACH AND DUODENUM: A SIGN OF PARTIAL OBSTRUCTION CAUSED BY DUODENAL ANOMALIES. (Eng.) Kassner, E. G.; Rose, J. S.; Kottmeier, P. K.; Schneider, M.; Gallow, G. M. (State Univ. New York, Downstate Medical Center, 450 Clarkson Ave., Box 45, Brooklyn, NY 11203). *Radiology* 114(3):683-686; 1975.

2606 CARCINOMA OF THE STOMACH: A TEN-YEAR MATERIAL. (Eng.) Svennevig, J.- L.; Nysted, A. (Aust-Agder Central Hosp., Arendol, Norway). *Acta Chir. Scand.* 142(1):78-81; 1976.

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2608 DRUGS AND GASTRIC DAMAGE. (Eng.) Cooke, A. R. (Veterans Univ. Hosps., Iowa City, IA 52240). *Drugs* 11(1):36-44; 1976.

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2613 HLA TYPES AND ABO BLOOD GROUPS IN INFANTS WITH PYLORIC STENOSIS AND THEIR MOTHERS. (Eng.) Darke, C.; Orellana, W.; Dodge, J. A. (Blood Transfusion Centre, Cardiff CF5 6XF, Wales, U.K.). *Tiss. Antigens* 7(3):189-190; 1976.

2614 GASTRIC ULCERATION ASSOCIATED WITH ASPIRIN INGESTION IN AN ACHLORHYDRIC PATIENT: A CASE REPORT. (Eng.) Rafoth, R. J.; Silvis, S. E. (Veterans Admin. Hosp., 54 St. and 48 Ave. South, Minneapolis MN 55417). *Am. J. Dig. Dis.* 21(3): 279-280; 1976.

2615 INDUCTION OF GASTRIC ULCERS IN THE FORESTOMACHECTOMIZED ALBINO RATS BY SHAY OPERATION. (Eng.) Ahamed, P. N.; Wao, M. A. (Dept. Zoology, Karnatak Univ., Dharwar 580003, India). *Indian J. Exp. Biol.* 13:230-233; 1975.

2616 THE STRESS ULCER SYNDROME. (Eng.) Speranza, V.; Basso, N. (Instituto di III Patologia Speciale Chirurgica, Universita degli Studi, Roma, Italy). *Abdom. Surg.* 18(5):120-125; 1976.

2617 GASTRIC VOLVULUS: LITERATURE REVIEW. (Rus.) Ponomarev, A. A.; Volozhin, S. I. (Ryazan Medical Inst., USSR). *Khirurgiia (Mosk.)* (6):126-130; 1975.

2618 PERFORATION OF THE STOMACH IN GASTRIC VOLVULUS. (Rus.) Leporskii, V. N.; Bezrukov, V. M. (Gorky Medical Inst., USSR). *Khirurgiia (Mosk.)* (6):123-124; 1975.

See also, 2510, 2511, 2513, 2525, 2529, 2549, 2550, 2551, 2569, 2573, 2639, 2644, 2651, 2665, 2670, 2682, 2749, 2782, 2783, 2939, 2964, 2976, 2996, 3003, 3010, 3019, 3034, 3053, 3058.

STOMACH

Peptic Ulcers

2619 ELECTROPHORETIC ANALYSIS OF ACID PROTEOLYTIC ZYMOGENS IN MUCOSA SURROUNDING GASTRIC ULCER. (Eng.) Ishimori, A.; Kawamura, T.; Sakurada, H.; Shirane, A.; Yamagata, S.; Miura, Y.; Tsuda, K.; Yamagata, S. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 118(4):349-354; 1976.

Acid proteolytic zymogens contained in biopsy specimens obtained from the area surrounding peptic ulcer of the stomach of three patients were analyzed by agar gel electrophoresis and were compared with the histopathological findings. The specimens obtained from the base of ulcer contained only slow moving protease (SMP), while mucosa located near the margin of ulcer showed the pyloric mucosal type of electrophoretic pattern. Increase in distance between the margin of ulcer and the site of biopsy changed the electrophoretic pattern of specimens to the fundic mucosal type. The electrophoretic findings of acid proteolytic zymogens were correlated closely to histological findings, and these changes were found to distribute in a patchy form around ulcer. Endoscopically healed scar was covered with regenerated epithelium containing parietal and chief cells; the electrophoretic pattern of acid proteolytic zymogens was of the fundic mucosal type. It is suggested that since atrophic changes of gastric mucosa around ulcer are known to remain relatively unchanged after healing, its clinical significance may be limited.

2620 THE VAGUS AND GASTRIN COMPONENTS IN PERIPHERAL BLOOD. (Eng.) Stadil, F.; Malmstrom, J.; Christensen, K. C. (Rigshospitalet, 2100 Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(Suppl. 37):77-80; 1976.

The role of the vagus in the pattern of peripheral blood gastrins was studied in 16 patients with duodenal ulcer before and 2 weeks after selective gastric vagotomy (8 patients) or truncal vagotomy (8 patients). In two normal subjects, vagal activity was stimulated by an i.v. insulin injection (0.2 IU/kg); one subject was also given an i.m. injection of atropine sulfate (30 μg/kg) 20 min prior to insulin. Blood was drawn from an indwelling cubital cannula at 0, 30, 45, and 60 min in the selective gastric vagotomy group and at 0, 10, 15, and 25 min in the truncal vagotomy group; blood was drawn in the normal subjects throughout a 240-min period. Gastrins were fractionated by gel chromatography. Serum gastrin was almost exclusively made up of gastrin component II (which is gastrin 34-like) and gastrin component III (gastrin 17-like). Both components rose after feeding, but the major increase was in component III. Although fasting levels and total responses of gastrin to food were higher postoperatively, the pattern of the gastrin components after the two operations remained unchanged. Total concentrations of gastrin increased to a peak level 45 min after insulin injection, whether or not the injection was preceded by atropine; this was due to an increase in component III and, to a lesser extent, to component II. These studies indicate that the release of gastrins is not reduced by vagotomy, and that there is no gastrin component that is selectively released into the circulation by vagal activity. Because earlier findings have shown that hypoglycemic gastrin response is of antral origin, the results suggest that the antrum is a source of both gastrin components II and III.

2621 SIMPLE CLINICAL METHOD OF MEASURING GASTRIC EMPTYING OF SOLID MEALS. (Eng.)

Ostick, D. G.; Green, G.; Howe, K.; Dymock, I. W.; Cowley, D. J. (Univ. Hosp. South Manchester, West Didsbury, Manchester M20 8LR, England). *Gut* 17(3): 189-191; 1976.

The use of a single fixed scintillation detector for the measurement of gastric emptying of solid meals was evaluated in 20 healthy subjects and in 10 patients with duodenal ulcer. The results were compared with those obtained simultaneously by a gamma camera. The mean half emptying time of the volunteers was 49.3 min with the gamma camera and 48.2 min with the scintillation detector. The rates and patterns of gastric emptying recorded by the two methods correlated well in both healthy volunteers (mean range=0.95) and in patients with ulcer (mean range= 0.89). It is concluded that scintillation detector provides a reliable and inexpensive method for measurement of gastric emptying of solid meals.

2622 GASTRIC AND DUODENAL ULCERS IN THE SAME PATIENT.

(Eng.) Bonnevie, O. (Gentofte Univ. Hosp., DK-2900 Hellerup, Denmark). *Scand. J. Gastroenterol.* 10(6):657-664; 1975.

An epidemiologic investigation of new cases of gastric and/or duodenal ulcer was conducted in 1,905 patients to determine the probability of developing a second ulcer. Gastric and duodenal ulcer were diagnosed on the basis of radiologic examinations. In 1,475 of the patients, a solitary duodenal ulcer occurred; in 350 a solitary gastric ulcer was diagnosed, while 80 patients presented with both forms of ulcer at the first positive radiologic examination. In patients with a gastric ulcer, the cumulated 6-yr probability of developing secondary ulcers was 8.8%, while the corresponding risk of secondary ulcer in patients with duodenal ulcer was 3.7%. The probability of developing secondary ulcers was the same in men and women, and was independent of the site and nature of the morphologic changes in the stomach and duodenum. Among patients with gastric ulcer, younger patients seemed particularly apt to develop secondary ulcers. This was not the case in patients with duodenal ulcer. The total probability of having both types of ulcers was 12%. The data indicate that gastric ulcer precedes duodenal ulcer more frequently than the reverse situation.

2623 MUCOSAL CHANGES IN GASTRIC ULCERATION AND THEIR RESPONSE TO CARBENOXOLONE SODIUM.

(Eng.) Steer, H. W.; Colin-Jones, D. G. (Radcliffe Infirmary, Oxford, England). *Gut* 16(8):590-597; 1975.

The gastric epithelium of 47 patients with benign gastric ulceration and of 6 normal subjects was studied to examine the relation between the activity of gastritis, bacteria, and gastric ulceration, and to evaluate the effect of carbenoxolone sodium treatment on the gastric mucosa in gastric ulceration. The concentrations of intraepithelial lymphocytes and polymorphonuclear leukocytes in lesser curve and prepyloric gastric ulcers were compared. There was a statistically significant reduction in the total number of intra-epithelial polymorphonuclear leukocytes before and after successful treatment with carbenoxolone sodium in 12 patients ($p< 0.05$). There was also a statistically significant decrease in the quantity of intra-epithelial lymphocytes in those patients with lesser curve gastric ulcers who were successfully treated with carbenoxolone sodium ($p<0.05$), whereas there was a significant increase in patients with prepyloric gastric ulcers treated successfully ($p<0.05$) and in patients whose treatment failed. The value of counts of migrating WBC as a method of objectively assessing the effect of healing drugs upon the gastric mucosa is discussed. *Pseudomonas aeruginosa* was found in many specimens from the ulcer patients, and this was not a contaminant. Carbenoxolone appeared to increase the amount of mucous but it had little effect upon the number of bacteria found. The data suggest that *P. aeruginosa* may be an etiologic factor in gastric ulceration.

2624 INHIBITION OF BASAL AND STIMULATED GASTRIC H^+ AND PEPSIN SECRETION IN DUODENAL ULCER PATIENTS BY METIAMIDE, AN H-2 HISTAMINE ANTAGONIST.

(Eng.) Bajaj, S. C.; Hirschowitz, B. I. (Dept. Medicine, Univ. Alabama, Birmingham, AL 35294). *Am. J. Dig. Dis.* 21(7):557-562; 1976.

The effects of metiamide on basal, histamine, and insulin-hypoglycemia-stimulated gastric H^+ and pepsin secretion were investigated in 23 studies of

6 duodenal ulcer patients. Metiamide was given .o. in one dose of 200 mg in the basal state in 4, uring histamine infusion in 11, and before insulin ypoglycemia stimulation in 8. In the latter eight atients, insulin was given at another time without etiamide. In 17 studies, acid secretion was supressed by metiamide--up to 75% in the basal state, 3% after histamine, and 80% after insulin. Pepsin ecretion was reduced to the same extent as H^+ in he histamine studies but not in the basal (57%) or insulin (44%) studies, so that in the latter, epsin/acid ratios were threefold greater than in ontrols. Blood levels of metiamide were measured n 17 studies. In 10 out of 11 who showed inhibiion of 40% or more, peak blood levels of metiamide ere 0.45-1.25 μg/ml. In five of six who did not how inhibition, blood levels were 0.05-0.04 μg/ml; in the sixth it was 0.8 μg/ml. Therefore, a critical blood level for suppression of basal or stimulated secretion appears to be approximately 0.45 μg/ml. The effectiveness of a small single dose of metiamide for inhibiting basal and stimulated secretion in duodenal ulcer patients suggests its use in the treatment of peptic ulcers.

2625 THE EFFECT OF VARIOUS FORMS OF MILK ON GASTRIC ACID SECRETION. STUDIES IN PATIENTS WITH DUODENAL ULCER AND NORMAL SUBJECTS. (Eng.) Ippoliti, A. F.; Maxwell, V.; Isenberg, J. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *Ann. Intern. Med.* 84(3):286-289; 1976.

The effect of various forms of milk and 0.15 M NaCl (control) on gastric acid secretion was studied in five patients with duodenal ulcer during a period of remission and in five normal subjects. Whole, low-fat, and nonfat milk (240 ml) each produced a significant ($p<0.05$) increase in mean gastric acid secretion in both groups. The NaCl did not increase gastric acid secretion above the basal level. Low calcium milk (240 ml) produced a significant ($p<0.05$) increase in mean acid secretion in the patients with duodenal ulcer, but not in the normal subjects. The acid secretory responses to milk were equivalent to those produced by a 300 ml 10% peptone meal and were approximately 20-35% of maximal betazole- or pentagastrin-stimulated acid output. There were no significant differences ($p>0.05$) between patients with duodenal ulcer and normal subjects, in response to whole, low fat, and nonfat milk expressed as a percentage of their maximal acid output. Because milk contains both protein and calcium, which are stimulants of gastric acid secretion, there is reason to question its frequent ingestion by patients with peptic ulcer.

2626 PARIETAL CELL VAGOTOMY WITHOUT DRAINAGE FOR TREATMENT OF DUODENAL ULCER: A TWO-TO THREE-YEAR FOLLOW-UP REPORT. (Eng.) Jordan, P. H., Jr. (1200 Moursund Ave., Houston, TX 77025). *Arch. Surg.* 111(4):370-376; 1976.

A 2- to 3-yr followup study was undertaken in 35 patients who underwent parietal cell vagotomy (PCV) without drainage. During the study, three patients died from causes unrelated to duodenal ulcer. Thirty-one of the remaining patients were followed up for 2 yr; 23 were studied after 3 yr. At the end of 2 yr, the mean basal acid output and peak hourly basal secretion rate were 43% and 47% less than the preoperative values, resp. The number of patients with a negative insulin test result postoperatively fell from 64% of patients tested at 2 months to 44% at 2 yr. The number of patients with an early positive insulin test result rose from 13% at 2 months to 28% at 2 yr after operation. There were two recurrent duodenal ulcers; one required reoperation. A gastric ulcer developed in one patient who was taking massive doses of aspirin (15 tablets/day), but the ulcer healed after aspirin withdrawal. One patient required operation for pyloric obstruction. Both dumping and diarrhea were reported by 7% of patients. These results suggest that PCV without drainage is an acceptable procedure for treatment of duodenal ulcer.

2627 GRADED GASTRECTOMY FOR DUODENAL ULCER--A FIVE-YEAR PROSPECTIVE STUDY. (Eng.) Talstad, I.; Fretheim, B.; Myren, J.; Holter, O. (Med. avdeling B, Haukeland sykehus, 5016 Bergen, Norway). *Scand. J. Gastroenterol.* 10(33):1; 1975.

2628 DUODENAL ULCER--AN IMMUNOLOGICAL DISEASE? (Eng.) Baenkler, H. W.; Domschke, W.; Domschke, S.; Wunsch, E.; Jaeger, E.; Demling, L. (Depts. Immunology Med., Univ. Erlangen-Nurnberg, Erlangen, West Germany). *Acta Hepatogastroenterol. (Stuttg.)* 22(4):209-210; 1975.

2629 GASTRO-DUODENAL ULCER IN PEDIATRIC AGE (CASE CONTRIBUTION). (Ita.) Oliveri, M.; Pene, V.; Tessore, G.; Salomone, P. (San Paolo Hosp., Savona, Italy). *Minerva Pediatr.* 27(21): 1195-1206; 1975.

2630 SIGNIFICANCE OF ELECTROGASTROGRAPHY IN THE DIAGNOSIS OF GASTRIC AND DUODENAL ULCER. (Rus.) Ryzhkova, K. G.; Tarasiuk, K. A. (Dept. Gastroenterology, Kiev Inst. Postgraduate Training Physicians, Kiev, USSR). *Vrach. Delo* (6):1-4; 1975.

2631 COMPLICATIONS OF JEJUNAL PEPTIC ULCERS. (Rus.) Pipia, I. K.; Kumsiashvili, R. N. (Tbilisi Medical Inst., Tbilisi, USSR). *Vestn. Khir.* 115(7):14-18; 1975.

2632 BILIARY TRACT COMPLICATIONS OF GASTRODUODENAL ULCER. (Rus.) Nechai, A. I.; Kurygin, A. A.; Dozortsev, V. F.; Zhuk, A. M. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Khirurgiia (Mosk.)* (6):64-68; 1975.

2633 EXOCRINE FUNCTION OF THE LIVER IN PATIENTS WITH DUODENAL ULCER. (Rus.) Nesterin, M. F.; Shirokova, K. I.; Narodetskaia, R. V.; Brilliantova, N. Iu. (Inst. Nutrition, USSR Acad. Medical Sciences, USSR). *Sov. Med.* (9):150-151; 1975.

2634 COMPARATIVE STUDY OF AUGMENTED HISTAMINE AND PENTAGASTRIN TESTS ON GASTRIC SECRETION OF ACID, PEPSIN AND ELECTROLYTES IN NORMAL CONTROL AND DUODENAL ULCER SUBJECTS FROM BOMBAY. (Eng.) Pimparkar, B. D.; Bhiwankar, N. T.; Kulkarni, B. S.; Mehta, J. M. (K.E.M. Hosp., Paerol, Bombay 40012, India). *Indian J. Med. Res.* 63(7):979-992; 1975.

2635 MATHEMATICAL MODELING OF GASTRO-DUODENAL ANASTOMOSES. (Rus.) Boterashvili, M. I. (Kiev Medical Inst., Kiev, USSR). *Klin. Khir.* (6):20-25; 1975.

2636 OBSTRUCTING PYLORODUODENAL ULCERS AND THEIR MANAGEMENT. (Eng.) Kaushik, S. P.; Moses, T. (Jawaherlal Inst. Medical Education Res., Pondicharry, India). *Int. Surg.* 60(8):413-415; 1975.

2637 CLINICAL, RADIOLOGICAL AND LABORATORY FINDINGS IN PATIENTS WITH DUODENAL ULCER, TREATED WITH MICRONIZED BISMUTH SUBNITRATE, SINGLY AND IN COMBINATION WITH ANTACIDS. (Eng.) Sezer, R.; Ozman, M.; Karaagac, M. (First Clin. Internal Medicine, Istanbul, Turkey). *Br. J. Clin. Prac.* 29(9):227-233; 1975.

2638 FURTHER SURGICAL MANAGEMENT OF GASTRIC ULCER WITH UNSUSPECTED MALIGNANT CHANGE. (Eng.) Desmond, A. M.; Nicholls, J.; Brown, C. (St. James's Hosp., Balham, London, England). *Ann. R. Coll. Surg. Engl.* 57(2):101-104; 1975.

2639 SURGICAL POLICY IN PERFORATED GASTRODUODENAL ULCERS. (Rus.) Kal'chenko, I. I.; Lys, P. V. (Kiev Inst. Postgraduate Training Physicians, Kiev, USSR). *Vestn. Khir.* 115(7):9-14; 1975.

2640 CHOICE OF SURGICAL METHOD FOR TREATMENT OF CHRONIC GASTRIC OR DUODENAL ULCER. (Pol.) Reslinski, B. (Instytut Chirurgii AM, 60-355 Poznan, ul. Przybyszewskiego 49, Poland). *Pol. Przegl. Chir.* 47(5):581-584; 1975.

2641 SURGICAL MANAGEMENT OF CHRONIC ULCERS OF GASTRIC LOCALIZATION. (Rus.) Gallinger, Iu. I.; Smirnov, A. S.; Nozdrachev, V. I. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (6):27-33; 1975.

2642 SURGICAL TREATMENT OF LATE COMPLICATIONS OF PARTIAL GASTRECTOMY DONE FOR PEPTIC ULCER. (Pol.) Jedrzejczyk, W. (I ZOZ im. M. Kopernika, 87-100 Torun, ul. Galczynskiego 27 m. 24, Poland). *Pol. Przegl. Chir.* 48(3):339-343; 1976.

2643 GASTRIC MUCOSAL RESECTION IN THE TREATMENT OF PEPTIC ULCERS: A 1-10 YEAR CLINICAL FOLLOW-UP. (Eng.) Kirk, R. M. (Royal Free Hosp., London, England). *Br. J. Surg.* 62(8):608-609; 1975.

2644 THERAPEUTIC RESULTS WITH SELECTIVE VAGOTOMY WITH ANTRAL RESECTION IN ULCER. (Rus.) Roman, L. I.; Sivoplias, A. L.; Palianitsa, S. I.; Seniutovich, R. V.; Tomusiak, T. L.; Gichko, I. I.; Stoliar, V. F.; Voitenko, G. I.; Fedoriak, A. D. (Chernovtsy Medical Inst., Chernovtsy, USSR). *Klin. Khir.* (12):31-34; 1975.

2645 A TEN-YEAR EXPERIENCE WITH THE TREATMENT OF DUODENAL ULCER BY VAGOTOMY. (Rus.) Sitenko, V. M.; Kurygin, A. A. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Vestn. Khir.* 115(7):3-9; 1975.

2646 VAGOTOMY IN SURGERY OF PEPTIC ULCER. (Rus.) Esperov, B. N.; Avakimyan, V. A.; Lysenko, A. P. (Kuban Medical Inst., Kuban, USSR). *Khirurgiia (Mosk.)* (6):23-27; 1975.

2647 LATE RESULTS OF PYLOROPLASTY AND VAGOTOMY IN PATIENTS WITH PERFORATED DUODENAL ULCERS. (Rus.) Mints, V. Ia.; Panin, Iu. P.; Morozova, I. V. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (6):33-39; 1975.

2648 REHABILITATION OF PATIENTS FOLLOWING SURGERY OF THE STOMACH FOR PEPTIC ULCER. (Rus.) Danilov, Iu. E.; Vantsian, E. N.; Berezov, Iu. E.; Vygodner, E. B. (Central Inst. Balneology and Physiotherapy, All-Union Scientific Res. Inst. Clinical and Experimental Surgery, USSR). *Khirurgiia (Mosk.)* (6):3-8; 1975.

2649 CHARACTERISTICS OF THE CLINICAL COURSE OF PEPTIC ULCER FOLLOWING GASTRIC RESECTION. (Rus.) Gorgol', V. A. (Dept. Hosp. Surgery No. 2, Kiev Medical Inst., Kiev, USSR). *Vrach. Delo* (6):5-8; 1975.

2650 CALCIUM METABOLISM IN PARTIAL GASTRODUODENECTOMY FOR DUODENAL ULCER. (Por.) Ziliotto, A., Jr.; Kunzle, J. E.; Ruffino, N. A.; Gouveia, E. G.; Scandiuzzi, N. A. (Servico de Cirugia, Rua Garibaldi, 1.271, Ribeirao Preto, SP, Brazil). *Rev. Paul. Med.* 84(3/4):73-78; 1974.

2651 HEMORRHAGE AFTER GASTRIC RESECTION FOR ULCEROUS DISEASE. (Rus.) Borovyi, E. M.; Bas, V. M.; Nesterenko, L. N. (Rovno Regional Hosp., Rovno, USSR). *Vestn. Khir.* 115(7):123-127; 1975.

2652 INDICES OF IRON METABOLISM IN THE BODY OF PATIENTS WITH GASTRIC AND DUODENAL ULCER FOLLOWING GASTRIC RESECTION. (Rus.) Gudivok, I. I.; Romaniak, M. I. (Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Vrach. Delo* (5):74-78; 1975.

2653 FATE OF PATIENTS IN WHOM NO GASTRODUODENAL ULCER WAS FOUND AT SURGERY. (Rus.) Trofimov, V. M. (S. M. Kirov Military Medical Inst., Leningrad, USSR). *Khirurgiia (Mosk.)* (6):19-23; 1975.

2654 DYNAMICS OF CHANGES OF ACETYLCHOLINE INDICES, ACTIVITY OF CHOLINESTERASE OF BLOOD SERUM AND OF ERYTHROCYTES IN PATIENTS WITH COMPLICATED ULCER DISEASE UNDER THE EFFECT OF TREATMENT. (Rus.) Gotsuliak, O. F.; Voloshin, A. I. (Chernovtsy Medical Inst., Chernovtsy, USSR). *Klin. Khir.* (6):25-29; 1975.

2655 EFFECT OF WORK IN HOT SHOPS AND PROFESSIONAL NOXIOUS FACTORS ON THE COURSE OF GASTRIC AND DUODENAL ULCER. (Rus.) Averina, N. I. (Voroshilovgrad Medical Inst., Voroshilovgrad, USSR). *Vrach. Delo* (5):78-82; 1975.

2656 STRUCTURE-ACTIVITY RELATIONSHIPS FOR ULCEROGENIC AND ADRENOCORTICOLYTIC EFFECTS OF ALKYL NITRILES, AMINES, AND THIOLS. (Eng.) Szabo, S.; Reynolds, E. S. (Peter Bent Brigham Hosp., Boston, MA 02115). *Environ. Health Perspect.* 11:135-140; 1975.

2657 TREATMENT OF PATIENTS WITH ULCER STENOSIS OF PYLORODUODENAL ZONE. (Rus.) Uteshev, N. S.; Pakhomova, G. V.; Subbotin, V. M. (N. V. Sklifosovskii Scientific Res. Inst. First Aid, Moscow, USSR). *Khirurgiia (Mosk.)* (6):8-14; 1975.

2658 FREE SERUM AMINO ACIDS IN PATIENTS WITH ULCER COMPLICATED BY STENOSIS. (Rus.) Grechishkin, D. K.; Zaporozhets, V. K. (Voroshilovgrad Medical Inst., Voroshilovgrad, USSR). *Klin. Khir.* (12):50-52; 1975.

2659 ACUTE ULCER OF THE GASTROINTESTINAL TRACT IN PATIENTS WITH DISEASES OF THE CARDIOVASCULAR SYSTEM. (Rus.) Kalugina, G. V.; Lysochenko, V. A.; Tugbaeva, L. Ia. (Propedeutic Dept. Internal Diseases, Kalinin Medical Inst., Kalinin, USSR). *Ter. Arkh.* 47(12):122-124; 1975.

See also, 2588, 2589, 2591, 2593, 2594, 2595, 2664, 2783, 2793, 2803, 3003.

SMALL INTESTINE

2660 THE APPEARANCE OF THE SMALL BOWEL MUCOSA IN OLD AGE. (Eng.) Webster, S. G. P.; Leeming, J. T. (Univ. Hosp. South Manchester, Manchester M20 8LR, England). *Age Ageing* 4:168-174; 1975.

Normal necropsy specimens of jejunal mucosa from 32 young subjects (13-59 yr) were compared histologically with specimens from the jejunums of 39 geriatric patients. Nineteen specimens from the young subjects showed predominantly finger-shaped villi (i.e., cylindrical with a round cross-section). Less than 50% of the total villi were "narrow leaves" or 2-5 times as long as wide; these were designated as group 1. Ten specimens showed predominantly narrow leaf-shaped villi; less than 50% were finger-shaped (group 2). The remaining three specimens showed predominantly leaf-shaped villi, but some broad forms or ridges were present (group 3). Among the geriatric patients, 20 had group 1 morphology, 11 had group 2, and 6 had group 3; the remaining two patients had villi possessing at least two angulations of greater than 90 degrees (convoluted villi). In 16 geriatric patients, the mean villous height was 371 μm, villous width was 121 μm; mucosal thickness was 143 μm, and epithelial cell height was 33.6 μm. These studies indicate that there are structural differences between the proximal jejunal mucosa of elderly subjects and younger controls. Previous studies showed that the weighted mean villous height for 160 jejunal biopsies was significantly greater ($p<0.02$) than that for these geriatric patients. There is also evidence from these studies that geriatric patients have broader villi than younger patients. As the absorption of many substances is dependent upon the surface area available, these changes in the elderly may account for small bowel functional impairment.

2661 STUDIES OF ULTRAMICROSTRUCTURE IN RELATION TO DISACCHARIDASE ACTIVITY IN THE JEJUNAL MUCOSA. (Eng.) Yoshida, Y.; Sasaki, G.; Goto, S.; Yanagiya, S.; Nakasato, N.; Takashina, K.; Ito, A.; Matsunaga, F. (Hirosaki Univ. Sch. Medicine, Zaifu-cho 5, Hirosaki, 036 Japan). *Gastroenterol. Jpn.* 10(2):141-145; 1975.

The ultrastructural changes of the jejunal mucosa were compared to changes in disaccharidase activity in the jejunal mucosa of Wistar rats, in 9 normal human subjects, and in 50 patients with gastrointestinal diseases or diabetes. Jejunal biopsies were obtained from a point approximately 20 cm distal to the ligament of Treitz, using either the Tohoku University biopsy capsule or Rubin's multipurpose biopsy tube. Biopsies were obtained from 16 patients following gastric resection, from 14 patients with gastric ulcer, from 5 with ulcerative colitis, from 2 with irritable colon, from 7 with hepatic disease, and from 6 with diabetes mellitus. A comparative light microscopic study showed no difference in the histology of the villi or the lamina propria mucosa of the nine controls and the patients. Electron microscopic studies revealed that patients with higher microvilli had a correspondingly higher lactase activity ($p<0.01$). The height of the microvilli was not correlated with the activities of maltase and sucrase ($p>0.05$). In rats, which were fed a 25% lactose diet (4 g/day/rat) for 6 weeks, a similar relation was found; lactase activity increased from 6.8 U to 12.8 ± 2.4 U, while the height of the microvilli increased from 1.82 U to 1.94 U. No significant increase was seen in maltase and sucrase. In rats which were fed for 4 weeks on a low calorie diet (controls, approximately 70 calories/day/rat), the lactase activity of the jejunal mucosa increased from 6.8 U to 9.3 ± 3.1 U, while the height was raised from 1.82 U to 2.09 U. Controls, which were fed a commercial diet, showed no change in enzyme activity or microvilli height when sacrificed after 6 weeks of feeding. It is concluded that a decrease in the height of the villi is the initial change in diffuse intestinal diseases, and that this causes lactase deficiency in patients with gastrointestinal disease.

2662 ACRODERMATITIS ENTEROPATHICA: RECENT FINDINGS CONCERNING CLINICAL FEATURES, PATHOGENESIS, DIAGNOSIS AND THERAPY.

(Eng.) Braun, O. H.; Heilmann, K.; Pauli, W.; Rossner, J. A.; Bergmann, K. E. (Kinderklinik des Stadtischen Krankenhauses, Postfach 1680, D-7530 Pforzheim, W. Germany). *Eur. J. Pediatr.* 121(4):247-261; 1976.

Serum zinc and fatty acid levels were studied in two siblings (a boy and girl, aged 10 and 6 weeks, resp.) with acrodermatitis enteropathica (AE). Their case reports and histological and ultrastructural findings are presented. The family was unremarkable, except for consanguinity five generations previously. The clinical symptoms of the two patients conformed to the known features of AE, the gastrointestinal involvement losing its significance with increasing age. In a stage of exacerbation in the boy, the serum level of oleic acid (18:1) was lowered and of linoleic (18:2) acid was slightly increased, while that of arachidonic acid was decreased. In both patients, the serum zinc levels were significantly lowered. Under substitution with $ZnSO_4$ (220 or 110 mg/day) the clinical condition improved, and the serum zinc levels returned to normal. Histologically, the small bowel mucosa was practically normal. Ultrastructural examination of jejunal biopsies revealed rather unspecific changes in the enterocytes in the form of numerous multivesicular bodies. The Paneth cells sometimes contained irregularly formed inhomogeneous structures within their cytoplasm, which were assumed to be inclusion bodies. In addition, the secretory granules varied in size and displayed a granular heteromorphic matrix. Frequently, they were confluent and formed giant granules. It is concluded that since AE is probably caused by a lack of zinc, successful treatment with zinc administration is possible, thus avoiding the toxic side effects of oxyquinoline. Further investigations must be made to determine whether the ultrastructural changes in the Paneth cells are specific for AE and are perhaps caused by the defect in the resorption of zinc.

2663 CONTAMINATION OF THE SMALL INTESTINE BY ENTEROTOXIGENIC COLIFORM BACTERIA AMONG THE RURAL POPULATION OF HAITI.

(Eng.) Klipstein, F. A.; Short, H. B.; Engert, R. F.; Jean, L.; Weaver, G. A. (Univ. Rochester Medical Center, 601 Elmwood Ave., Rochester, NY 14642). *Gastroenterology* 70(6): 1035-1041; 1976.

The bacterial population within the proximal small intestine was examined for the presence of coliform bacteria in 15 Haitians with tropical sprue or other milder gastrointestinal abnormalities. Coliform bacteria were isolated by either aerobic or anaerobic culture techniques from aspirates of the proximal small intestine of 4 of 5 Haitians with tropical sprue but not from any of 10 well nourished patients with milder gastrointestinal complaints. *Klebsiella pneumoniae* and *Klebsiella ozaenae* were cultured from the jejunal aspirates of two sprue patients and *Escherichia coli* from the other two. Fifteen colonies of coliform bacteria cultured from each aspirate were specifically identified by their biotype. In three instances, every colony in each aspirate was the same; in the fourth aspirate, two biotypes of *E. coli* were present, one of which grew under both aerobic and anaerobic culture conditions and another of which grew only under anaerobic conditions on initial isolation. A randomly selected strain of each of the five coliform biotypes isolated was examined for enterotoxigenicity by determining the effect of variously prepared cell-free preparations on water transport in the rat jejunum using standard marker perfusion techniques. Every strain tested was toxigenic; one produced only a heat-stable toxin, one produced a heat-labile toxin only, and three elaborated both forms of enterotoxin. These observations indicate that most Haitians with tropical sprue have colonization of the proximal small intestine by a specific strain of enterotoxigenic coliform bacteria, but this is not the case among Haitians who have milder intestinal abnormalities.

2664 IgA DEFICIENCY AND SEVERE POST-VAGOTOMY DIARRHOEA.

(Eng.) McLoughlin, G. A.; Bradley, J.; Chapman, D. M.; Temple, J. G.; Hede, J. E.; McFarland, J. (Royal Southern Hosp., Liverpool, U.K.). *Lancet* 1(7952):168-170; 1976.

The occurrence of severe post-truncal vagotomy

rhea was investigated to determine classifications
atients who will be susceptible to this complica-
. Fourteen out of 2,058 patients developed
re diarrhea within 6 months after operation, and
following parameters were tested in the sera of
: IgA, IgG, IgM, IgE, C3, C4, antinuclear factor,
basement membrane antibodies, rheumatoid-factor
r, isohemagglutinin titer, and the presence of
bodies to egg albumen, yolk, milk proteins, and
en. Six of the 14 patients were asymptomatic
re operation, and were found to have no measurable
m IgA, IgM, or IgE. Jejunal biopsy was normal,
pt that in one patient it revealed partial vil-
atrophy. Each of the six subjects had markedly
ed urinary indican and IgA deficiency. It is
ested that antecedent IgA deficiency may account
the incidence of post-vagotomy diarrhea and that
perative screening can reduce the incidence of
complication.

5 PRIMARY GASTROINTESTINAL LYMPHOMAS:
CLINICAL, RADIOLOGICAL, AND THERAPEUTIC
SIDERATIONS BASED ON 42 CASES. (Fre.) Taleb, N.;
uri, K.; Nassr, W. (No affiliation given). *J.*
Liban. 28(2):233-258; 1975.

ty-two cases of primary gastrointestinal lymphomas
reviewed. Clinical findings indicate that the
ness occurs predominantly in men aged 20-50 yr,
is characterized by abdominal or epigastric
ns (92.5%), altered general health (82.5%), and
ominal mass (55%). Localizations are most fre-
ntly on the small intestine. Histologically,
iculosarcomas are most frequent, followed by
phosarcomas and Hodgkin's disease. Therapeu-
ally, complete resection is chosen when possible,
h chenotherapy as the second choice. Prognosis
gely depends upon the magnitude of the intestinal
sions. The extreme rarity of peripheral nodal in-
sion supports the hypothesis that primary gastro-
testinallymphomas constitute an independent and
tonomous disease from lymphomas of the lymph nodes.
wever, the peripheral invasion was observed as a
condary manifestation in two cases.

56 EFFECT OF STREPTOZOCIN ON GASTRIN RELEASE.
(Eng.) Stadil, F.; Stage, J. G. (Rigshospi-
let, 2100 Copenhagen, Denmark). *Scand. J. Gastro-*
terol. 11(Suppl. 37):67-70; 1976.

e action of streptozocin on normal gastrin release
s evaluated in six patients with carcinoid tumors
d in two patients with malignant insulinomas be-
use of the drug's toxic effect on gastrin producing
lls in some patients with gastrinomas. Streptozocin
s given in a dose of 2 or 4 g during 30-60 min at
tervals of 6-12 weeks; one patient was given the
ug i.v., while the others were given streptozocin
rough the hepatic or superior mesenteric artery.
e total dose ranged from 6 to 18 g, and the ob-
rvation period ranged from 3 to 18 months. Blood
r gastrin determination was drawn from an indwell-
g venous catheter during the first 19 hr after
treptozocin infusion in 22 instances (in 5 patients),
nd gastrin was determined radioimmunochemically.
treptozocin did not depress gastrin levels acutely
any of the patients. In all patients but one,
gastrin levels were doubled after 6 g of streptozocin was given during a 4-month period and they tripled after 10 g were given during a 9-month period. When the gastrin level at the time of the first treatment was compared with the level at the last treatment, the difference was significant ($p<0.01$). One patient with increasing gastrin levels developed a duodenal ulcer with massive bleeding after three infusions of 6 g. It is concluded that streptozocin does not damage normal gastrin-producing cells and that it stimulates gastrin release when given over prolonged periods. Peptic ulceration may be an important side effect during long-term treatment.

2667 MORPHOLOGICAL CHANGES OF THE SMALL INTESTINE FOLLOWING JEJUNO-ILEAL SHUNT IN OBESE SUBJECTS. (Eng.) Fenyo, G.; Backman, L.; Hallberg, D. (Karolinska sjukhuset, Stockholm, Sweden). *Acta Chir. Scand.* 142(2):154-159; 1976.

Forty-seven patients underwent jejuno-ileal shunt operations (end-to-side or end-to-end) for massive obesity, and 17 of them had a second laparotomy for various reasons (cholelithiasis, 6; persisting obesity, 5; cicatrical hernia, 4; sterilization, 1; and jaundice, 1). At both operations, the length of the functioning jejunal and ileal segments was determined, and in biopsies, the intestinal villus height was determined. The second laparotomies were not performed until at least 6 months after establishment of jejuno-ileal bypass. The mean length of functioning jejenum was increased by 33% ($p<0.05$)and the mean elongation of functioning ileum by 73% ($p<0.001$). The mean villus height in functioning jejunum increased by 33% ($p<0.001$) and in functioning ileum by 70% ($p<0.001$). The mean villus height in the jejunal blind loop decreased by 30% ($p<0.001$). The demonstrated hypertrophic changes in the functioning part of the small intestine following jejuno-ileal bypass represent the morphological basis of functional intestinal adaptation. The effect of this adaptation is illustrated in the characteristic weight diagram of an obese patient after bypass operation: the loss of weight ceases, a period of stability ensues, and then the patient begins to regain weight to some extent. Thus, a balance seems to exist between the functional capacity of the intestinal mucosa and the body weight.

2668 THE KALLIKREINOGEN-KALLIKREIN SYSTEM OF THE BLOOD SERUM IN PATIENTS WITH ENTEROCOLITIS. (Rus.) Larovaia, G. A.; Dotsenko, V. L.; Kozhevnikova, L. T. (Central Inst. Postgraduate Training Physicians, USSR). *Ter. Arkh.* 47(12):62-65; 1975.

2669 TUMORS OF THE DUODENUM AND SMALL INTESTINE. (Fre.) Stavorovsky, M. (Municipal Governmental Medical Center, Ichilov Hosp., Tel-Aviv, Israel). *Med. Chir. Dig.* 4(4):233-235; 1975.

2670 MOTOR FUNCTION OF THE DIGESTIVE TRACT AFTER EXTENSIVE RESECTION OF THE SMALL INTESTINE. (Rus.) Genyk, S. N. (Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Vestn. Khir.* 115(7):44-48; 1975.

2671 LATE RESULTS OF SURGERY FOR CHRONIC DUODENAL OBSTRUCTION. (Rus.) Slobozhankin, A. D.; Zarubenko, I. N. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Khirurgiia (Mosk.)* (6): 41-47; 1975.

2672 MORPHO-FUNCTIONAL CHANGES IN THE PANCREAS CONNECTED WITH RESECTION OF THE JEJUNUM IN CATS. (Rus.) Barabadze, K. N. (A. N. Natishvili Inst. Experimental Morphology, Georgian SSR Acad. Sciences, Tbilisi, USSR). *Biull. Eksp. Biol. Med.* 80(7):112-115; 1975.

2673 CHANGES IN INTESTINAL FLORA AFTER COLECTOMY. (Jpn.) Sakata, I. (3rd Dept. Surgery, N.U.S.M., Japan). *Nichidai Igaku Zasshi* 340(1): 23-41; 1975.

2674 A CASE OF LEIOMYOSARCOMA OF THE DUODENUM WITH METASTASES LOCALIZED TO THE LIVER. (Jpn.) Onoda, K.; Ohba, S. (Tohsei Natl. Hosp., Japan). *Gan No Rinsho* 21(1):60-63; 1975.

2675 ADENOCARCINOMA OF THE FIRST JEJUNAL ANSA (CLINICAL ASPECTS AND LITERATURE REVIEW). (Ita.) Sorice, G.; Germi, M. R. (Istituto di Clinica Chirurgica Generale e Terapia Chirurgica, Universita di Genova, Italy). *Chir. Patol. Sper.* 22(6):339-349; 1974.

2676 REDUCED INTESTINAL LACTASE ACTIVITY IN CHRONIC ALCOHOLICS. (Spa.) Mate Jimenez, J.; Lozano, F.; Pajares Garcia, J. M. (Gran Hospital del Estado, Spain). *Rev. Clin. Esp.* 136(1):27-30; 1975.

2677 A CASE OF MULTIPLE PERFORATING ULCER OF THE INTESTINE DURING TREATMENT WITH PREDNISOLONE, ASPIRIN AND POTASSIUM CHLORIDE. (Rus.) Tysiachnova, O. V. (Hosp. No. 30, Novosibirsk, USSR). *Klin. Med.* 53(9):126-128; 1975.

2678 POSTOPERATIVE ILEUS. (Ger.) Oesch, I.; Deucher, F. (Chirurgische Klinik, Kantonsspital, CH-5001 Aarau, Switzerland). *Helv. Chir. Acta* 42(5/6):791-792; 1975.

2679 METABOLIC CONSEQUENCES OF THE DYSFUNCTION OF THE TERMINAL ILEUM. (Spa.) Lagarriga, J. (Hospital Militar Regional de Guadalajara, Apartado Postal 4-705, Guadalajara, Jal., Mexico). *Rev. Invest. Clin.* 27(4):307-328; 1975.

2680 INTERNAL THERAPY OF HEMORRHAGES OF THE SMALL INTESTINE. (Ger.) Schmutzler, R. (No affiliation given). *Thromb. Diath. Haemorrh.* (Suppl 61):265-267; 1975.

2681 SMALL INTESTINAL HEMORRHAGES: PATHOANATOMICAL CAUSES. (Ger.) Lindner, J.; Schutte, B. (No affiliation given). *Thromb. Diath. Haemorrh.* (Suppl 61):221-252; 1975.

2682 IMMEDIATE AND LATE RESULTS OF A NEW TYPE OF JEJUNOPLASTY AFTER GASTRECTOMY. (Bul.) Parapanov, G. (Medical Acad., Plovdiv, Bulgaria). *Khirurgiia (Sofiia)* 28(6):525-531; 1975.

2683 EARLY REOPERATIONS FOR COMPLICATIONS AFTER SURGERY ON THE SMALL AND LARGE INTESTINES. (Fre.) Loygue, J.; Levy, Et.; Laigneau, P. (Hopital Saint-Antoine, F-75000 Paris, France). *Helv. Chir. Acta* 42(5/6):827-836; 1975.

2684 ADAPTATION MECHANISM OF THE ORGANISM FOLLOWING RESECTION OF THE SMALL INTESTINE. (Ukr.) Genik, S. M. (Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Fiziol. Zh.* 21(5):667-674; 1975.

2685 BALLOON KYMOGRAPHIC STUDY OF EXTRADIGESTIVE MOTOR ACTIVITY OF THE DUODENUM IN CHRONIC ACHLORHYDRIC GASTRITIS. (Rus.) Khlystov, V. G. (Central Scientific Res. Inst. Gastroenterology, USSR). *Klin. Med.* 53(10):68-71; 1975.

2686 JEJUNAL RETICULOSARCOMA IN CELIAC DISEASE IN AN ADULT. (Fre.) Capron, J. P.; Marti, R.; Delamarre, J. (Centre Hospitalier Universitaire, 1, place Victor-Pauchet, F 80000 Amiens, France). *Nouv. Presse Med.* 5(2):80-82; 1976.

2687 CONGENITAL DUODENAL ADHESIONS. (Eng.) Christensen, V.; Jensen, H.-E. (Surgical Dept. I., Kommunehospitalet, Copenhagen, Denmark). *Acta Chir. Scand.* 141(8):759-762; 1976.

2688 ENTEROLITH OBSTRUCTION OF THE ILEUM AS A COMPLICATION OF JEJUNAL DIVERTICULITIS: REPORT OF A CASE. (Eng.) Svanes, K.; Halvorsen, J. F. (Dept. General Surgery, Univ. Bergen, Bergen, Norway). *Acta Chir. Scand.* 141(8):816-819; 1976.

2689 MEGACYSTIS-MICROCOLON-INTESTINAL HYPOPERISTALSIS SYNDROME: A NEW CAUSE OF INTESTINAL OBSTRUCTION IN THE NEWBORN. REPORT OF RADIOLOGIC FINDINGS IN FIVE NEWBORN GIRLS. (Eng.) Berdon, W. E.; Baker, D. H.; Blanc, W. A.; Gay, B.; Santulli, T. V.; Donovan, C. (Babies Hosp., 167th St. and Broadway, New York, NY 10032). *Am. J. Roentgenol.* 126(5):957-964; 1976.

2690 A STOMAL APPLIANCE FOR PROVISIONAL ILEOSTOMY IN NEONATES OF LOW WEIGHT AT BIRTH WHO REQUIRE TEMPORARY ILEOSTOMY. (Eng.) Beder, O. E.; Stevenson, J. K. (Univ. Washington Sch. Dentistry, Seattle, WA 98195). *Am. J. Surg.* 13(5):643-644; 1976.

2691 THE OPEN JEJUNUM: A PATCH FOR LARGE DUODENAL DEFECTS. (Eng.) Asfaw, I.; Thoms, N. W.; Huang, C. L. (Wayne State Univ. Sch. Medicine, 540 E. Canfield St., Detroit, MI 48201). *Am. J. Surg.* 13(5):601-602; 1976.

2692 SEROSAL PATCH REPAIR FOR BENIGN DUODENOCOLIC FISTULA SECONDARY TO DUODENAL DIVERTICULUM. (Eng.) Kellum, J. M.; Boucher, J. K.; Ballinger, W. F. (196 Station Hosp., APO New York 09055). *Am. J. Surg.* 13(5):607-610; 1976.

See also, 2325, 2328, 2351, 2506, 2512, 2513, 2525, 2529, 2540, 2576, 2699, 2601, 2605, 2607, 2656, 2657, 2695, 2698, 2706, 2741, 2773, 2774, 2780, 2782, 2792, 2956, 2973, 2976, 2994, 2997, 3002, 3003, 3007, 3010, 3021, 3024, 3025, 3034, 3050, 3051, 3058.

SMALL INTESTINE

Malabsorption

2693 MALIGNANCY IN RELATIVES OF PATIENTS WITH COELIAC DISEASE. (Eng.) Stokes, P. L.; Prior, P.; Sorahan, T. M.; McWalter, R. J.; Waterhouse, J. A. H.; Cooke, W. T. (General Hosp., Birmingham B15 2TJ, England). *Br. J. Prev. Soc. Med.* 30(1):17-21; 1976.

The incidence of malignancy in relatives of patients with celiac disease was compared with that of the general population to determine whether they also have an increased incidence of histocompatibility (HL-A) HL-A8 antigen. The study group consisted of 139 patients, and 1329 relatives including grandparents, parents, siblings of parents, and siblings of the patients. There was a significantly increased number of cancer deaths in the relatives ($p<0.001$), using the method of years at risk to calculate expected numbers of cancer deaths in the general population. In female relatives, the difference between observed and expected cancer deaths was highly significant ($p<0.01$). There was also an increase in cancer deaths among male relatives, but this was statistically insignificant. In the female relatives, the only site that showed a significant cancer excess was the breast. This analysis has not shown any general increase in deaths from cancer at all sites in relatives of patients with celiac disease. It has not been determined whether the excess of cancer at specific sites is due to a familial effect, independent of celiac disease, or whether it is the result of a small proportion of relatives with undiagnosed disease displaying an enhanced risk of certain cancers in a pattern similar to that in patients with established celiac disease.

2694 T CELL DEPLETION IN UNTREATED ADULT COELIAC DISEASE. (Eng.) O'Donoghue, D. P.; Lancaster-Smith, M.; Laviniere, P.; Kumar, P. J. (St. Bartholomew's Hosp., London EC1A 7BE, England). *Gut* 17(5):328-331; 1976.

Thymus dependent lymphocytes (T cells) were quantitated in 24 patients with treated adult celiac disease (ACD), 29 untreated patients, 39 healthy subjects (of comparable age, sex distribution, and nutritional status), and in 10 patients with malabsorption due to conditions other than celiac disease. The T cells were quantitated as peripheral blood cells that spontaneously formed rosettes with sheep RBC. For intra-epithelial lymphocyte counts, biopsies were obtained from the duodenojejunal flexure in 19 patients. The proportional and absolute numbers of T lymphocytes in the peripheral blood of patients with untreated ACD (42.4% T cells or 577 ± 51 T cells/ml) were decreased when compared with treated patients (62% or 1050 ± 95.5, $p<0.002$, $p<0.002$), controls (59% or 942 ± 58, $p<0.002$, $p<0.002$), and patients with malabsorption not due to celiac disease ($p<0.002$, $p<0.05$). Treated patients had the same proportional and absolute numbers of T cells as controls. Total peripheral blood lymphocytes did not differ significantly in the four groups. Nine patients who were studied both before and after treatment with a gluten-free diet showed a proportional rise in T cells ($p<0.001$). Jejunal intra-epithelial lymphocyte counts showed an inverse correlation with the proportional ($p<0.001$) and absolute ($p<0.01$) peripheral blood T cell counts. These results suggest that T cells may be involved in the pathogenesis of celiac disease and that their depletion in untreated patients may explain partially the associated cell-mediated immunodysfunction. Because normal numbers of circulating T cells were found in patients with malabsorption from conditions other than celiac disease, it is unlikely that the T cell depletion in untreated celiac disease is a manifestation of malabsorption per se.

2695 FOOD ANTIBODIES IN PATIENTS WITH DERMATITIS HERPETIFORMIS AND ADULT COELIAC DISEASE--RELATIONSHIP TO JEJUNAL MORPHOLOGY. (Eng.) Kumar, P. J.; Ferguson, A.; Lancaster-Smith, M.; Clark, M. L. (St. Bartholomew's Hosp., London, England). *Scand. J. Gastroenterol.* 11(1):5-9; 1976.

Serum antibodies to a variety of dietary proteins were investigated in 26 patients with adult celiac disease (ACD), in 38 patients with dermatitis herpetiformis (DH) and various small bowel abnormalities, and in 50 normal blood donors. Precipitating antibodies were detected using a micro-gel diffusion technique; crude antigens were prepared from gluten, wheat flour, oatmeal, rice flour, cow's milk, bovine calf serum, pig and horse serum, hen's egg white and yolk, and chicken serum. Passive hemagglutination was used to detect antibodies to five protein constituents of cow's milk. Antibodies to all food antigens were detected for all antigens except rice, egg white, and horse serum. The incidence of one or more positive tests was highest in 14 untreated ACD patients (73.4%) and in 13 patients with DH with subtotal villous atrophy (SVA, 57.4%). These values decreased with morphological improvement, being 56.4% in the 17 ACD patients with partial villous atrophy (PVA) who were treated with gluten-free diet, 33.4% in 16 patients with DH and PVA, and 0% in 9 patients with normal biopsies. The height of the serum antibody titer also fell with morphological improvement. There was no correlation between serum immunoglobulin (Ig) A, IgG, or IgM and the presence or absence of food antibodies; however, patients with the presence of both food and anti-reticulin antibodies had significantly higher mean IgG (1200 mg%) when compared to patients with neither of these antibodies (mean 860 mg%, $p<0.05$). Twenty-two of 71 patients had a positive anti-reticulin antibody: 7 of 14 with untreated ACD, 4 of 18 with treated ACD, 7 of 15 with DH and SVA, 3 of 17 with DH and PVA, and 1 of 7 with DH and a normal biopsy. Eleven patients were studied before and after 3 months on a gluten-free diet. Two patients had no antibodies before or after treatment. Of the remaining patients, all but one showed a decrease in antibody score; this patient showed deterioration in clinical symptoms and jejunal biopsy despite a gluten-free diet. The results indicate that there is an abnormally high incidence of dietary antibodies in patients with DH; this correlates with the degree of severity of small bowel damage.

2696 PROTEIN PATTERNS OF BRUSH-BORDER FRAGMENTS IN CONGENITAL LACTOSE MALABSORPTION AND IN SPECIFIC HYPOLACTASIA OF THE ADULT. (Eng.) Freiburghaus, A. U.; Schmitz, J.; Schindler, M.; Rotthauwe, H. W.; Kuitunen, P.; Launiala, K.; Hadorn, B. (Dept. Pediatrics, Univ. Berne, Berne, Switzerland). *N. Engl. J. Med.* 294(19):1030-1032; 1976.

Brush border membrane proteins of the small bowel mucosa were separated on polyacrylamide gels from intestinal biopsy specimens obtained from four children with congenital lactose malabsorption, from two adults with specific hypolactasia, and from one adult control. The protein pattern and the residual activity of lactase were compared. The protein band corresponding to brush border lactase was reduced in intensity, but was never completely absent in three patients with congenital malabsorption. No difference in gel patterns was detected when this pattern in congenital deficiency was compared to that obtained from the two patients with adult-type selective hypolactasia. In one patient with congenital lactose malabsorption, the protein band corresponding to lactase activity was not detectable. The results suggest that the mechanisms leading to low lactase activity in congenital and adult forms of lactose intolerance are similar. The hypothesis of a very early "switch off" of lactase biosynthesis seems to be confirmed.

2697 ENTEROTOXIGENIC INTESTINAL BACTERIA IN TROPICAL SPRUE: IV. EFFECT OF LINOLEIC ACID ON GROWTH INTERRELATIONSHIPS OF Lactobacillus acidophilus AND Klebsiella pneumoniae. (Eng.) Mickelson, M. J.; Klipstein, F. A. (Bigelow Lab. Ocean Science, West Boothbay Harbor, ME 04575). *Infect. Immunol.* 12(5):1121-1126; 1975

The effect of linoleic acid on the growth interrelationships of *Lactobacillus acidophilus* and *Klebsiella pneumoniae* was investigated in patients with tropical sprue, using a glucose limited continuous culture system. The culture system consisted of bacteria from a normal fasted subject, and from a patient with overt, untreated tropical sprue. *K. pneumonia* did not grow, even after a period of 96 hr, when the pH of the medium was acidified to 5.6 prior to inoculation by the addition of 100 μmol of either hydrochloric or lactic acid. Maximum growth occurred within 20 hr when the initial pH was 6.8. One gram per liter of glucose in the medium was required for *L. acidophilus* to produce enough lactic acid to reduce the pH. When the population density of *L. acidophilus* was reduced by the presence of a sufficient concentration of linoleic acid (1 mg/ml), the invading *K. pneumonia* successfully colonized the system and, once established, suppressed the growth of *L. acidophilus* The results indicate that gram positive enteric bacteria suppress coliform growth and that this effect is reversible by the addition of linoleic acid.

2698 UNUSUAL ANOMALY OF THE SMALL INTESTINE WITH MALABSORPTION. (Eng.) Palmer, P. E.; Ruiz, U.; Stadecker, M. J. (New England Medical Center Hosp., 171 Harrison Ave., Boston, MA 02111). *Am. J. Dis. Child.* 130(3):330-332; 1976.

2699 MALABSORPTION IN CHILDREN: A REVIEW. (Eng.) Koshy, A.; Tandon, R. K. (All-India Inst. Medical Sciences, Ansari Nagar, New Delhi-110016, India). *Indian Pediatr.* 12(10):1021-1027; 1975.

2700 GLUTEN TOXICITY IN COELIAC DISEASE [Abstract] (Eng.) Green, F. H. Y.; Freed, D. L. J. (Dept. Pathology, Bacteriology, and Virology, Univ. Manchester, Manchester M13 9PT, England). *Lancet* 1(7962):749-750; 1976.

2701 AUTOANTIBODIES IN PATIENTS WITH COELIAC DISEASE AND DERMATITIS HERPETIFORMIS [Abstract]. (Eng.) Baker, P. G.; Palmer, R. I. (Frenchay Hosp., Bristol, England). *Lancet* 1(7962): 750; 1976.

2702 AN ALTERNATIVE MECHANISM FOR GLUTEN TOXICITY IN COELIAC DISEASE. (Eng.) Weiser, M. M.; Douglas, A. P. (Harvard Medical Sch., Boston, MA 02114). *Lancet* 1(7959):567-569; 1976.

See also, 2500, 2631, 2686, 2992, 3028.

LARGE INTESTINE

2703 THE PRECURSOR TISSUE OF ORDINARY LARGE BOWEL CANCER. (Eng.) Lane, N. (Columbia Univ. Coll. Physicians and Surgeons, New York, NY 10032). *Cancer Res.* 36(7):2669-2672; 1976.

Information regarding the morphological origin of large bowel neoplasia is reviewed. Hyperplastic polyps are 10 times as common as adenomas and must be distinguished from them since they are unrelated as a precursor tissue to either adenomas of carcinomas. Only adenomas are relevant to the development of the common moderately and well-differentiated large bowel cancer. Depending upon three related factors (increasing size, a sessile rather than pedunculated mode of growth, and a villous rather than tubular microscopic architecture), minute (1- to 2-mm) carcinomas or microcancer may be found with increasing frequency in adenomas. Minute or microcancer has not been observed in normal mucosa, i.e., unassociated with adenomatous tissue. In familial polyposis, adenomas (but not carcinomas) as small as one or two crypts have been found in grossly normal areas of mucosa. Direct one-step transformation from normal crypt cells to cancer, without formation of adenomatous epithelium, does not seem to be the usual pathway. It is suggested that human polyposis is the best model for the study of large bowel neoplasia.

2704 LYMPHOID HYPERPLASIA OF THE COLON: (2 CASE PRESENTATIONS). (Eng.) Ferran, J. L.; Betoulieres, P.; Bonnet, H.; Pous, G.; Jean, R. (Hopital Saint-Charles, F 34000 Montpellier, France). *Ann. Radiol.* 18(4):489-498; 1975.

Two cases of lymphoid hyperplasia of the colon (LHC) in young male infants are presented. A premature infant of 35 weeks gestation presented at 35 days of life with a febrile intestinal obstruction and minimal enterocolitis for which an emergency ileostomy was performed. At 10 months of age, a barium enema revealed the characteristic appearance of lymphoid hyperplasia, which was no longer found 7 months later. In the second case, intestinal obstruction related to Hirschsprung's disease was noted on the second day of life. Following 2 months of medical management, a clinical diagnosis of secondary enterocolitis was confirmed by laparotomy. A right-sided biopsy of the colon demonstrated multiple normal ganglion cells. The typical aspect of lymphoid hyperplasia with epithelial destruction and mucosal glands adjacent to these foci was noted and a right ileostomy was performed. At 17 months of age, the ileostomy was closed and was replaced by a left colostomy, awaiting definitive surgery. Colon biopsy confirmed the presence of chronic inflammatory infiltrations. It is suggested that the moderate initial lesions of enterocolitis and the lymphoid hyperplasia are related. In neither case did symptoms indicate intestinal tract involvement. LHC was probably benign. The diagnosis was made by double contrast barium enema that demonstrated disseminated, often umbilicated nodules of uniform size. It is suggested that LHC is not a disease, in itself, but is a simple exaggeration of a physiologic defense mechanism.

2705 LYMPHOID TISSUE AND LYMPHOID-GLANDULAR COMPLEXES OF THE COLON: RELATION TO DIVERTICULOSIS. (Eng.) Kealy, W. F. (King's Coll. Hosp., London, England). *J. Clin. Pathol.* 29(3): 245-249; 1976.

The relation of lymphoid-glandular complexes and the lymphoid tissue of the colon to the development of diverticulosis was studied. In 50 colons with diverticula, the number of lymphoid nodules per square centimeter, expressed as an average for the colon as a whole (excluding the cecum and the areas containing diverticulae), ranged from 2.4 to 9.5; in 50 colons without disease, it ranged from 1.5 to 7.3; and in 3 specimens from Nigerian patients, it ranged from 3.1 to 3.9. In 351 partial and total colectomy specimens examined microscopically, lymphoid-glandular complexes were observed in 51 cases. These complexes were always associated with a lymphoid nodule and protruded through a gap in the muscularis mucosa. It is concluded that the lymphoid nodules in apposition to the muscularis mucosae may constitute weak points in the bowel wall, that the increase in their number in diverticular disease may represent a prediverticular state, and that these and the lymphoid-glandular complexes may play a part in the pathogenesis of diverticula.

2706 COLONIC PSEUDO-OBSTRUCTION: A NEW COMPLICATION OF JEJUNOILEAL BYPASS. (Eng.) Barry, R. E.; Benfield, J. R.; Nicell, P.; Bray, G. A. (Bristol Royal Infirmary, Bristol, England). *Gut* 16(11):903-908; 1975.

The cases of five patients in whom jejunoileal bypass (3 end-to-side and 2 end-to-end) was complicated 1.5-3 yr later by symptoms of colonic pseudo-obstruction are reported. The patients were all women, aged 25-44 yr, and the operation was performed for morbid obesity in all cases. In each case, the colon was markedly elongated, dilated, and atonic, but there was no demonstrable organic obstruction. Full thickness rectal biopsy in one case showed normal intrinsic nervous plexuses and ganglia.

Serum electrolytes were normal. Functional and defunctionalized small bowel were not involved. Symptoms varied from complete colonic paralysis to incapacitating crampy abdominal pain and distention. In the three patients with end-to-side bypass, dilatation affected the entire colon; in the two patients with end-to-end bypass, the dilatation was localized to colon distal to the anastomosis with the defunctionalized small bowel. In one case, resection of the affected portion of the colon resulted in recurrence distal to the new site of drainage of defunctioned bowel. In two cases, treatment with anti-anaerobe antibiotics (metronidazole in both cases, kanamycin in one case, and clindamycin in the other) produced dramatic but temporary relief of symptoms. These preliminary observations suggest that bacterial overgrowth in the defunctionalized loops of small bowel may play an important role in the development of colonic pseudo-obstruction.

2707 PHYSIOPATHOLOGY OF MEGARECTUM: THE ASSOCIATION OF MEGARECTUM WITH ENCOPRESIS. (Eng.) Meunier, P.; Mollard, P.; Marechal, J.-M. (Hopital Debrousse, 69322 Lyon Cedex 1, France). *Gut* 17(3): 224-227; 1976.

Studies were performed on 15 control subjects and on 61 children with a radiological megarectum (70% were encopretics) to determine a correlation between the frequency of encopresis and a decrease in conscious rectal sensitivity. Pressure measurements were performed using a tandem system of three side-opening PVC catheters connected to an electromanometer and thermal-tip recorder. In control subjects, the reflex threshold of internal sphincter relaxation (mean distension 15.33 ml) and the rectal sensitivity threshold (mean 14.66 ml) were obtained with a comparable volume of rectal distension. In children with megarectum, the reflex threshold (mean 15.33 ml) was not modified, but sensitivity was often considerably reduced, and the incidence of encopresis increased proportionally with the decrease in sensitivity. On the basis of sensitivity measurements, the megarectum patients were segregated into three groups: 32% of those with a mean sensitivity threshold of 29.0 were ençopretics, probably due to psychogenic factors; 82% of children with a mean threshold of 83.85 were encopretics; and those with a mean of 209.33 were all encopretics.

2708 TREATMENT OF FAMILIAL POLYPOSIS OF THE COLON. (Swe.) Axemo, P.; Darle, N.; Garellick, G.; Larsson, A.; Nilsson, L. (Sahlgrenska sjukhuset, Goteborg, Sweden). *Lakartidningen* 72(36):3301-3304; 1975.

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2713 RADIOLOGIC MONITORING 10 DAYS AFTER 100 CONSECUTIVE CASES OF COLONIC RESECTION WITH SINGLE-LAYER ANASTOMOSIS [Abstract]. (Eng.) Hell, K.; Allgower, M. (Chirurgisches Departement Universitatsklinik, Basel, Switzerland). *Langenbecks Arch. Chir.* 339:733; 1975.

2714 DIFFERENTIAL DIAGNOSIS BETWEEN BENIGN AND MALIGNANT STENOSIS OF THE SIGMOID COLON [Abstract]. (Eng.) Bruckner, R.; Krieg, H.; Ehlert, C.-P. (Chirurg. Universitatsklinik, Mainz, Germany). *Langenbecks Arch. Chir.* 339:730; 1975.

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Cognacq-Jay, F 51100 Reims, France). *Nouv. Presse Med.* 4(39):2807; 1975.

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2750 MORE ABOUT THE TREATMENT OF RECTAL PROLAPSE IN CHILDREN. (Rus.) Malyshev, Iu. I.; Gulin, V. A. (D. I. Ulyanov Medical Inst., Kuibyshev, USSR). *Klin. Khir.* (8):50-53; 1975.

2751 SOME ERRORS IN THE TREATMENT OF ACUTE APPENDICITIS IN CHILDREN. (Rus.) Sitkovskii, N. B.; Radionenko, V. Ia. (Kiev Medical Inst., Kiev, USSR). *Klin. Khir.* (8):56-59; 1975.

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2754 UNUSUAL COMPLICATION OF DIVERTICULOSIS OF THE LARGE INTESTINE. (Rus.) Kuznetsov, V. I. (Chelyabinsk Medical Inst., USSR). *Vestn. Khir.* 115(8):125-126; 1975.

2755 THE PREVENTION OF COLORECTAL CANCER. (Fre.) Soullard, J.; Potet, F. (Hopital Bichat, 170, boulevard Ney, F 75018 Paris, France). *Arch. Fr. Mal. App. Dig.* 64(3):197-200; 1975.

2756 CURRENT ASPECTS OF CHRONIC CECAL AMEBOMAS: THREE CASES. (Fre.) Moline, C.; Essioux, H.; Cristau, P.; Kassem, A.; Roue, R.; Laverdant, Ch. (Hopital Instruction Armees Begin, F 94160 Saint-Mande, France). *Ann. Med. Interne* 126(10):687-695; 1975.

2757 COLORECTAL POLYPS AND CARCINOMAS. (Fre.) Lefebvre, C.; Vosse-Matagne, G.; Desaive, C. (Service Radiotherapie, Universite Liege, Belgium). *Rev. Med. Liege* 30(11):370-372; 1975.

See also, 2504, 2507, 2508, 2514, 2541, 2542, 2543, 2544, 2552, 2555, 2567, 2609, 2665, 2668, 2670, 2673, 2678, 2683, 2689, 2691, 2760, 2764, 2770, 2782, 2994, 3003, 3008, 3022, 3024, 3033, 3034, 3050, 3051, 3056.

LARGE INTESTINE
Ulcerative Colitis

2758 INFLAMMATORY BOWEL DISEASE IN ALL THREE MEMBERS OF ONE FAMILY. (Eng.) Rosenberg, J. L.; Kraft, S. C.; Kirsner, J. B. (Dept. Medicine, Univ. Chicago, 950 East 59th St., Chicago, IL 60637). *Gastroenterology* 70(5):759-760; 1976.

The occurrence of inflammatory bowel disease in all three members of one family are described. Inflammatory bowel disease occurred in a mother, followed 7 and 9 yr later by the disease in her 7-yr-old son and her husband, resp. A diagnosis of ulcerative colitis, ulcerative proctitis, and Crohn's disease was made in the mother, son, and husband, resp. Blood counts, serum protein electrophoresis, febrile agglutinins, and leukocyte karotypes were normal in all three family members. Cellular and humoral immunity also failed to explain this phenomenon, and histocompatibility antigen W27 was not detected. The appearance of inflammatory bowel disease in an entire family emphasizes the potential role of genetic and environmental influences in the pathogenesis of some cases of ulcerative colitis and Crohn's disease.

2759 UNEXPLAINED BRONCHOPULMONARY DISEASE WITH INFLAMMATORY BOWEL DISEASE. (Eng.) Kraft, S. C.; Earle, R. H.; Roesler, M.; Esterly, J. R. (Univ. Chicago, Hosp. Box 400, 950 E. 59th St., Chicago, IL 60637). *Arch. Intern. Med.* 136(4):454-459; 1976.

The case reports and the clinical and laboratory data of six patients who developed severe, unexplained, chronic bronchopulmonary disease 3-13 yr after the onset of nonspecific inflammatory disease of the colon are presented. All had chronic bronchitis; bronchiectasis was diagnosed in four, and an obstructive type of pulmonary dysfunction was noted in five. Four of the six, including the two with only chronic bronchitis, had no history of smoking. There was an initial correlation between the pulmonary symptoms and the intestinal disease, except in two patients who developed overt pulmonary disease following total proctocolectomy. The frequent occurrence of extra-intestinal lesions suggests that ulcerative colitis and regional enteritis are systemic disorders; chronic unexplained bronchopulmonary disease may be another infrequent complication in such patients.

2760 SERUM LYSOZYME IN INFLAMMATORY BOWEL DISEASE. (Eng.) Nugent, F. W.; Mallari, R.; George, H.; Ridley, N. (Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215). *Gastroenterology* 70(6):1014-1016; 1976.

Serum lysozyme (muramidase) concentrations were measured in 3 groups of patients--49 controls, 21 patients with ulcerative colitis and proctitis, and 63 patients with Crohn's disease--to determine its effectiveness in the differential diagnosis of Crohn's disease. The mean concentration for each group was 7 ± 2 for controls, 7 ± 2 for patients with ulcerative colitis and proctitis, and 10 ± 4 for patients with Crohn's disease ($p<0.0005$). All patients with ulcerative colitis and proctitis and only 1 patient in the control group had a serum lysozyme level greater than normal (12 μg/ml). Of the Crohn's group, 43 patients (68%) had serum lysozyme levels of 11 μg/ml or less, and 20 patients (32%) had serum lysozyme levels greater than 11 μg/ml. The relation of the serum lysozyme level to total WBC count, polymorphonuclear leukocyte count, and monocyte count was studied; the only significant relation was with total WBC count ($n=60$, $r=0.243$, and $-0.05<p<0.10$). There was no relation between the level of serum lysozyme and the activity of the Crohn's disease, severe, moderate, mild, or remission ($0.25<p<0.50$). There was an inverse relation between the serum lysozyme level and the presence of extracolonic manifestations ($0.02<p<0.05$, $t=2.048$). Although a significant difference was observed between values in patients with Crohn's disease and values observed in those with ulcerative colitis or control patients, an important overlap was found between these groups. Further studies are necessary to explain the disparate results between this study and previous reports.

2761 CLINICAL AND IMMUNOLOGICAL ASPECTS OF PATHOGENESIS AND TREATMENT OF ULCERATIVE COLITIS IN CHILDREN. (Eng.) Schafer, K. H.; Blaker, F. (Universitats-Kinderklinik Hamburg, Hamburg, W. Germany). *Paediatrician* 5(1/2):57-66; 1976.

The definition, the clinical and immunological aspects of pathogenesis, and the clinical and immunological aspects of therapy in childhood ulcerative colitis are reviewed. Ulcerative colitis is a rare nonspecific inflammatory bowel disease with increasing frequency in children. It differs from the closely related granulomatous colitis (Morbus Crohn) by some clinical, histological, immunological, and especially biochemical findings. The etiology and pathogenesis of the disease are unknown. Some observations indicate that the disposition to unspecific inflammatory bowel disease is based upon genetic factors. The concept of an immunopathogenesis of ulcerative colitis is based upon the frequency of this disease with autoimmune diseases and autoallergic reactions, on immunologic findings of activated immune reactions against colonic protein and other autoantigens, on circulating immune complexes, and on an alteration of the complement system. Whenever steroids and azulfidine do not help in patients with frequent relapses, it is possible to induce remissions with azathioprine. Relapses are less frequent during therapy with azathioprine as compared to therapy with only steroids and azulfidine. The long-term effects of immunosuppressive therapy on this disease and on immunologic function in children with ulcerative colitis are unknown.

2762 SERUM OROSOMUCOID IN ULCERATIVE COLITIS: ITS RELATION TO CLINICAL ACTIVITY, PROTEIN LOSS, AND TURNOVER OF ALBUMIN AND IgG. (Eng.) Jensen, K. B.; Jarnum, S.; Koudahl, G.; Kristensen, M. (Rigshospitalet, DK-2100, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(2):177-183; 1976.

Serum orosomucoid, hemoglobin, and erythrocyte sedimentation rate (ESR) values were compared with clinical disease activity, intestinal protein loss, and albumin and IgG turnover in 22 patients with ulcerative colitis. The disease activity was graded into three categories (inactive, mild, or severe) according to the number of bowel movements per day, and the degree of fever and tachycardia. Disease activity showed no correlation with the hemoglobin measurements ($p>0.10$) or ESR ($p>0.10$) but more severe disease was associated with higher serum orosomucoid concentration ($p<0.01$). More severe colitis was associated with increased gastrointestinal protein loss, decreased serum albumin, increased fractional catabolic rate of albumin and IgG, and increased IgG synthesis rate. Serum orosomucoid was negatively correlated to serum albumin and positively correlated to fractional catabolic albumin and IgG rates, gastrointestinal protein loss, and ESR. It is concluded that serum orosomucoid is a reliable indicator of clinical activity in ulcerative colitis and is superior to hemoglobin and ESR determinations.

2763 POLYPOSIS IN ULCERATIVE COLITIS. (Eng.) Teague, R. H.; Read, A. E. (Bristol Royal Infirmary, Bristol, England). *Gut* 16(10):792-795; 1975.

The occurrence of inflammatory polyposis following severe colitis was assessed in 150 patients, by total colonoscopy and multiple biopsies taken at intervals of 10 cm. Inflammatory polyposis was found in 25 patients, and 6 of them had a large (>1.5 cm) solitary polyp, which radiologically resembled carcinoma, in 4 cases. Adenomatous polyps were observed in four patients. Three carcinomas were found at endoscopy, of which two were entirely unsuspected. In all cases, endoscopic polypectomy or surgical intervention was performed to establish the exact histologic diagnosis. It is suggested that the use of endoscopic examination of the bowel in ulcerative colitis may eliminate, or at least delay, the need for colectomy, until the clinician is sure that it is required.

2764 INHIBITION OF LEUCOCYTE MIGRATION BY ANTIGENS FROM HUMAN COLON AND E. coli O 14 IN PATIENTS WITH ULCERATIVE COLITIS. (Eng.) Fixa, B.; Komarkova, O.; Skaunic, V.; Nerad, M.; Kojecky, Z. (Second Dept. Medicine, 500 36 Hradec Kralove, Czechoslovakia). *Scand. J. Gastroenterol.* 10(5): 491-493; 1975.

The leukocyte migration inhibition test was performed in 55 patients with ulcerative colitis and in 25 controls. The extract from human fetal colon and the lipopolysaccharide antigen from *Escherichia coli* O 14 were used as antigens. The leukocyte migration in patients with ulcerative colitis was significantly inhibited in the presence of these antigens. In the 21 patients with an active form of ulcerative colitis the leukocyte migration was significantly inhibited as compared to the leukocyte migration in patients with a nonactive form of the disease. The results support the suggestion that in ulcerative colitis, autoimmunization to colon may be induced through stimulation with cross-reacting bacterial antigens.

2765 DEFICIENCY OF ALPHA-1-ANTITRYPSIN, FATTY LIVER AND ULCERATIVE COLITIS. A HITHERTO UNKNOWN SYMPTOM-COMPLEX WITH ACCOUNT OF FAMILIAL PREDISPOSITION. (Dan.) Pedersen, J. K. (Tage Hansens Gade 23 st. tv., DK-8000 Arhus C, Denmark). *Ugeskr. Laeger* 136(49):2741-2744; 1974.

The case of a 13-yr-old girl with ulcerative colitis, fatty liver, and α-1-antitrypsin deficiency is presented. A pedigree study indicated that the α-1-antitrypsin deficiency was a recessive hereditary trait, because both parents had the Pi-type MZ genotype, while the patient had Pi-type ZZ. There was a high incidence of pulmonary disease in the mother's family, together with α-1-antitrypsin values occurring at low normal levels. Low values for α-1-antitrypsin levels were also found in the father's siblings, although there was no association with pulmonary disease. It is concluded that the enzyme deficiency facilitated the development of ulcerative colitis in this patient and that the fatty liver was probably secondary to the ulcerative colitis, as no evidence of primary liver disease was found.

2766 POSTOPERATIVE MORTALITY AND COMPLICATIONS AFTER COLECTOMY FOR ULCERATIVE COLITIS. (Eng.) Koudahl, G.; Kristensen, M. (Rigshospitalet, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(37):117-122; 1976.

2767 ANTIBODY COATED RED CELLS WITH AND WITHOUT HEMOLYSIS IN CHRONIC ULCERATIVE COLITIS. (Eng.) Jacob, J.; Lance, K. P. (Fairmont Clinic, Fairmont, WV 26554). *Am. J. Gastroenterol.* 65(4): 324-328; 1976.

2768 IMMUNE COMPLEXES IN ULCERATIVE COLITIS--AN EXPERIMENTAL MODEL [Abstract]. (Eng.) Hodgson, H. J. F.; Skinner, J. M.; Potter, B. J.; Jewell, D. P. (Royal Free Hosp., London, NW3, England). *Gut* 17(5):399; 1976.

2769 THE MANAGEMENT OF ULCERATIVE COLITIS. (Eng.) Watkinson, G. (Gartnavel General Hosp., Glasgow, Scotland). *Practioner* 216(1296): 642-648; 1976.

2770 ULCERATIVE DISEASE OF THE COLON PROXIMAL TO PARTIALLY OBSTRUCTIVE LESIONS: REPORT OF TWO CASES AND REVIEW OF THE LITERATURE. (Eng.) Feldman, P. S. (Univ. Hosp., 225 West Dickinson St., San Diego, CA 92103). *Dis. Colon Rectum* 18(7): 601-612; 1975.

2771 ULCERATIVE COLITIS OR CROHN'S COLITIS: IS DIFFERENTIATION NECESSARY? (Eng.) Veidenheimer, M. C.; Nugent, F. W.; Haggitt, R. C. (Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215). *Surg. Clin. North Am.* 56(3): 721-726; 1976.

2772 TREATMENT OF ULCERATED RECTOCOLITIS WITH IMMUNOSUPPRESSORS. (Ita.) Silvi, G.; (Spedali Riuniti, Livorno, Italy). *Clin. Ter.* 76(4): 341-351; 1976.

2773 CREATININE AND AMINO ACID PROFILES OF ILEAL AND FAECAL FLUIDS [Abstract]. (Eng.) Padovan, W.; Owens, C. W. I.; Ferguson, R. (Univ. Coll. Hosp., Medical Sch., Birmingham, England). *Clin. Sci. Mol. Med.* 49(3):27P; 1975.

2774 PROSTAGLANDINS, ULCERATIVE COLITIS, AND SULPHASALAZINE [Letter to Editor]. (Eng.) Gould, S. R. (St. Mark's Hosp., City Road, London EC1, England). *Lancet* 2(7942):988; 1975.

See also, 2503, 2805, 3022, 3060.

PANCREAS

2775 PANCREATIC ASCITES: RECOGNITION AND MANAGEMENT. (Eng.) Sankaran, S.; Walt, A. J. (Wayne State Univ. Sch. Medicine, 540 E. Canfield, Detroit, MI 48201). *Arch. Surg.* 111(4):430-434; 1976.

Thirty-one episodes of pancreatic ascites in 26 alcoholic patients treated between 1958 and 1975 were analyzed. Twenty patients (65%) experienced abdominal pain and 10 (32%) had concomitant pleural effusions roentgenographically. Although a leaking pancreatic pseudocyst was the cause of ascites in at least 21 episodes (70%), an abdominal mass could only be palpated in 2 of 26 patients. Roentgenographic series of the upper part of the gastrointestinal tract failed to demonstrate pancreatic pseudocyst in 7 of 21 episodes (33%). Endoscopic retrograde pancreatography in conjunction with intraoperative pancreatography made a vital contribution to surgical therapy. Medical treatment or external drainage during 18 episodes resulted in death in 4 (22%) and recurrences of ascites or pancreatic pseudocyst in 9 (64%). Since routine pancreatography followed by pancreatic resection or internal drainage has been instituted, mortality and recurrence have been reduced to zero. The authors conclude that definitive procedures that attack the site of the leakage directly are the preferred technique for the treatment of pancreatic ascites, unless the degree of inanition, the acuteness of associated pancreatitis, or the nature of the pseudocyst makes external drainage the only feasible approach.

2776 SUBCUTANEOUS FAT NECROSIS ASSOCIATED WITH PANCREATIC DISEASE. (Eng.) Hughes, P. S. H.; Apisarnthanarax, P.; Mullins, J. F. (Univ. Texas Medical Branch, Galveston, TX 77550). *Arch. Dermatol.* 111(4):506-510; 1976.

The case of a 58-yr-old man who presented with subcutaneous fat necrosis associated with asymptomatic pancreatic disease is presented. The patient had a long history of alcoholism. About 25 erythematous nontender subcutaneous nodules (1-5 cm diameter) were present over the lower part of the back, buttocks, thighs, and lower areas of the legs. The histological findings consisted of focal fat necrosis and "ghost-like" cells with thick, shadowy walls and no nuclei. Distant foci of fat necrosis are probably due to the local action of hematogeneous-borne trypsin and lipase. Treatment consisted of anticholinergic medication, low-fat diet, leg elevation, and support stockings, which alleviated the symtpoms. Because underlying pancreatic disease may be asymptomatic, histopathological study of all cases of panniculitis, particularly those occurring in older men, should be undertaken.

2777 EFFECTS OF SHOCK ON THE PANCREATIC ACINAR CELL: CELLULAR AND SUBCELLULAR EFFECTS IN HUMANS. (Eng.) Jones, R. T.; Garcia, J. H.; Mergner, W. J.; Pendergrass, R. E.; Valigorsky, J. M.; Trump, B. F. (Univ. Maryland Sch. Medicine, Baltimore, MD 21201). *Arch. Pathol.* 99(12):634-644; 1975.

The effects of varying degrees of shock on the pancreatic acinar cell were studied in 22 patients within minutes of somatic death. The tissues were fixed, sectioned, stained, and examined by light and electron microscopy. By light microscopy, it was difficult to ascertain any differences among the shock groups (mild, moderate, and severe). Electron microscopy disclosed subcellular alterations that could be correlated well with the type, severity, and duration of shock. Mild cases of shock or shock of short duration showed mild cell damage, while extreme cases of hemorrhagic or septic shock showed cell death and necrosis. No morphological evidence for lysosomal initiation of damage was seen, but it is clear that the pancreas can undergo severe cell injury during shock, resulting in the release of further damaging enzymes, most probably from zymogen granules rather than from lysosomes. The results indicate that changes characteristic of the cellular response to acute lethal or sublethal injury occur in human pancreatic acinar cells during shock.

2778 PANCREATIC LESIONS CAUSED BY WIRSUNGOGRAPHY: THE RADIOLOGIST'S POINT OF VIEW [Letter to Editor]. (Fre.) Ledoux-Lebard, G.; Bonnin, A.; Sahut d'Izarn, J. J. (C.H.U. Cochin, 27 rue du Fg-St-Jacques, F 75674 Paris Cedex 14, France). *Nouv. Presse Med.* 4(43):3071; 1975.

2779 COMPARATIVE DETECTION OF PANCREATIC BODY-TAIL ENLARGEMENT USING THE SUPINE TRANSLATERAL AND AXIAL PANCREATIC VIEWS: A PROSPECTIVE STATISTICAL STUDY. (Eng.) Sorabella, P. A.; Campbell, W. I.; Seaman, W. B. (Coll. Physicians Surgeons, Columbia Univ., New York, NY). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(1):143-153; 1975.

2780 DYNAMICS OF THE SPHINCTER OF ODDI [Abstract]. (Eng.) Lynen, F. K. (Abt. Chirurgie der Med. Fakultat an der RWTH Aachen, Germany). *Langenbecks Arch. Chir.* 339:751; 1975.

2781 WORK GROUP III. DISEASES OF THE PANCREAS. (Eng.) Webster, P. D.; Anderson, M. C.; Brooks, F. P.; Fitzgerald, P. J.; Go, V. L. W.; Jamieson, J. D.; et al. (No affiliation given). *Gastroenterology* 69(5):1088-1094; 1975.

2782 ANEURYSMS OF THE SMALL PANCREATIC ARTERIES: A CAUSE OF UPPER ABDOMINAL PAIN AND INTESTINAL BLEEDING. (Eng.) Harris, R. D.; Anderson, J. E.; Coel, M. N. (Dept. Radiology, Univ. California, La Jolla, CA). *Radiology* 115(1):17-20; 1975.

2783 GASTRIC ACID SECRETION IN PANCREATIC DISEASE. (Eng.) Gupta, S.; Rao, T. R. G. (Inst. Medical Sci., Banaras Hindu Univ., Varanasi, India). *Digestion* 12(3):189-191; 1975.

2784 PANCREATIC ASCITES: A CASE REPORT AND REVIEW OF THE LITERATURE. (Eng.) Munoz, J. N.; Bose, S. (Mount Sinai Hosp. Medical Center, California Ave. at 15th St., Chicago, IL 60608). *Am. J. Dig. Dis.* 20(12):1178-1183; 1975.

2785 CANCERS OF THE PANCREAS AND BILIARY TRACT: EPIDEMIOLOGICAL CONSIDERATIONS. (Eng.) Fraumeni, J. F., Jr. (Natl. Cancer Inst., Bethesda, MD 20014). *Cancer Res.* 35(11):3437-3446; 1975.

2786 CANCER OF THE PANCREAS: PALLIATIVE OPERATION, WHIPPLE PROCEDURE, OR TOTAL PANCREATECTOMY? (Eng.) Brooks, J. R.; Culebras, J. M. (Peter Bent Brigham Hosp., 721 Huntington Ave., Boston, MA 02115). *Am. J. Surg.* 131(4):516-520; 1976.

2787 ENHANCED RENAL EXCRETION OF DICLOXACILLIN IN PATIENTS WITH CYSTIC FIBROSIS. (Eng.) Jusko, W. J.; Mosovich, L. L.; Gerbracht, L. M.; Matter, M. E.; Yaffe, S. J. (Sch. Pharmacy and Medicine, State Univ. New York, Buffalo, NY). *Pediatrics* 56(6):1038-1044; 1975.

2788 INVESTIGATION OF THE "PANCREAS PATIENT." (Eng.) Jabbari, M. (Queen Mary Veterans' Hosp., 4565 Queen Mary Rd., Montreal, PQ H3W 1W5, Canada). *Can. J. Surg.* 19(3):192-194; 1976.

2789 ECTOPIC PANCREAS CAUSING MASSIVE UPPER GASTROINTESTINAL HEMORRHAGE: REPORT OF A CASE DIAGNOSED ARTERIOGRAPHICALLY. (Eng.) Clark, R. E.; Teplick, S. K. (Veterans Admin. Hosp., San Francisco, CA 94121). *Gastroenterology* 69(6):1331-1333; 1975.

2790 EFFECT OF PARENTERALLY ADMINISTERED INTRALIPID ON PANCREATIC JUICE SECRETION FROM PANCREATIC FISTULA. (Rus.) Kachorovskii, B. V.; Vashchuk, V. V. (Lvov Scientific Res. Inst. Hematology and Blood Transfusion, Lvov, USSR). *Vrach. Delo* (1):66-68; 1976.

2791 FIBRO-ADENOMA OF THE DUCTUS PANCREATICUS AND CHRONIC PANCREATITIS. (Fre.) Leger, L.; Louvel, A.; Ligoury, C.; Hovasse, P.; Travagli, J.-P. (Clinique chirurgicale, Hopital Cochin, 27, rue du faubourg Saint-Jacques, F 75674 Paris Cedex 14, France). *Nouv. Presse Med.* 5(7):407-410; 1976.

2792 PROGRESS IN THE TREATMENT OF TUMORS OF THE DUODENOPANCREATIC REGION. (Ger.) Bodner, E. (Chirurgische Universitatskliniken, Anichstrasse 35, A-6020 Innsbruck, Austria). *Z. Allgemeinmed.* 51(28):1237-1240; 1975.

2793 LESION OF THE PANCREAS AFTER GASTRIC RESECTION FOR COMPLICATED GASTRIC AND DUODENAL ULCER. (Rus.) Terekhov, N. T.; Demidiuk, P. F. (Kiev Scientific Res. Inst. Hematology and Blood Transfusion, Kiev, USSR). *Klin. Khir.* (11):36-40; 1975.

See also, 2498, 2536, 2547, 2548, 2666, 2672, 2796, 2849, 2928, 3010, 3034.

PANCREAS

Pancreatitis

2794 A PROSPECTIVE STUDY TO DETERMINE THE EFFICACY OF ANTIBIOTICS IN ACUTE PANCREATITIS. (Eng.) Finch, W. T.; Sawyers, J. L.; Schenker, S. (Dept. Surgery, Vanderbilt Univ., Nashville, TN). *Ann. Surg.* 183(6):667-671; 1976.

The efficacy of prophylactic antibiotic treatment (Ampicillin) was evaluated in 58 patients with acute alcohol-induced and idiopathic pancreatitis and in 27 controls in a double-blind, randomized, prospective study. Thirty-one patients received antibiotics: 19 received 500 mg Ampicillin every 6 hr, 11 received 1 gm every 6 hr, and 1 patient received 1 g Keflin every 6 hr for 7 days. The groups were compared to determine: length of hospitalization, number of days required to return to a normal serum amylase value, number of days required for the patient to become afebrile, complication rate, and recurrence rate. No statistically significant difference was found in any of the parameters except the recurrence rate, which was higher in the antibiotic group. These data indicate that prophylactic use of Ampicillin is not indicated in patients with routine acute alcohol-induced or idiopathic pancreatitis. The role of prophylactic antibiotics in patients with pancreatitis related to biliary calculi and those with more severe varieties of acute hemorrhagic or necrotizing pancreatitis must be more clearly defined.

2795 CHANGES OF THE NITROGEN METABOLISM IN PATIENTS WITH ACUTE PANCREATITIS AND CHOLECYSTOPANCREATITIS. (Rus.) Kovalyov, M. M.; Teplyi, K. V.; Shuliarenko, V. A. (Suvorov St. 19, Apt 46, Kiev-10, USSR). *Klin. Khir.* (5):13-18; 1975.

Nitrogen metabolism was investigated in 52 patients with acute pancreatitis and in 65 patients with cholecystopancreatitis. The patients with acute pancreatitis showed hypoproteinemia, hypoalbuminemia, reduction of blood urea level and total nitrogen in 24-hr urine, increased residual blood nitrogen, hyperglobulinemia (due to α-1, α-2, and gamma-globulins), and increased urinary excretion of amine nitrogen. These changes were most pronounced in destructive forms of pancreatitis. The use of protein agents and anabolic steroids in the complex treatment of patients with pancreatitis promoted normalization of the nitrogen metabolism.

2796 MAJOR ARTERIAL HEMORRHAGE: A COMPLICATION OF PANCREATIC PSEUDOCYSTS AND CHRONIC PANCREATITIS. (Eng.) Stanley, J. C.; Frey, C. F.; Miller, T. A.; Lindenauer, S. M.; Child, C. G., III. (Univ. Hosp., 1405 E. Ann St., Ann Arbor, MI 48104). *Arch. Surg.* 111(4):435-440; 1976.

Clinical experience with 12 patients, aged 18-68 yr, with major arterial hemorrhage as a direct complication of pancreatic pseudocysts and chronic pancreatitis is presented. Chronic alcoholism (11 patients) and blunt abdominal trauma (1 patient) were the basis for pancreatic disease. Spontaneous hemorrhage occurred in eight patients. Bleeding into the gastrointestinal tract occurred in eight patients; bleeding into the peritoneal cavity occurred in four patients; and it was intracystic in one patient. Splenic, pancreaticoduodenal, gastroduodenal, and gastroepiploic arteries were the sources of hemorrhage. Operative procedures included local control of bleeding in six patients, distal pancreatectomy in three patients, and pancreaticoduodenectomy in one patient. Four patients died of hemorrhagic complications of pancreatic disease, including one not subjected to operation. It is suggested that extirpation of diseased pancreatic tissue may lessen the morbidity and mortality attributed to this complication of pancreatitis.

2797 PERSISTENT OBSTRUCTIVE JAUNDICE, CHOLANGITIS, AND BILIARY CIRRHOSIS DUE TO COMMON BILE DUCT STENOSIS IN CHRONIC PANCREATITIS. (Eng.) Warshaw, A. L.; Schapiro, R. H.; Ferrucci, J. T., Jr.; Galdabini, J. J. (Massachusetts General Hosp., Boston, MA 02114). *Gastroenterology* 70(4): 62-67; 1976.

The diagnostic approach to and treatment of six patients with common bile duct obstruction complicating chronic pancreatitis are presented. The most frequent symptoms included: painless obstructive jaundice, recurrent cholangitis, secondary biliary cirrhosis, and chronic abdominal pain. These symptoms were often attributed to the pancreatitis, cirrhosis of the liver, or alcoholic hepatitis. Diagnosis of the biliary obstruction was effectively completed using either endoscopic retrograde cholangiopancreatography or operative cholangiography. Biliary bypass, by anastomosis of the common bile duct to the small intestine, relieved symptoms and improved liver function during the first postoperative year. It is suggested that stenosis of the common bile duct be considered in any diagnosis of chronic pancreatitis or whenever surgical treatment of pancreatitis is contemplated. Recognition of acute cholangitis is important since it requires immediate antibiotic therapy and surgical decompression after sepsis has been controlled.

2798 ALCOHOL-ASSOCIATED PANCREATITIS IN A 15-YEAR-OLD [Abstract]. (Eng.) Thomson, W. O.; Imrie, C. W.; Joffe, S. N. (Royal Infirmary, Glasgow G4 OSF, Scotland). *Lancet* 2(7947):1256; 1975.

2799 SOME PROBLEMS OF PATHOGENESIS AND TREATMENT OF ACUTE ALLERGIC PANCREATITIS. (Rus.) Danilenko, M. V.; Moroz, I. M.; Borovets, I. A. (Lvov Medical Inst., ul. Kutuzova, d. 90, kv. 2, Lvov 17, USSR). *Klin. Khir.* (5):30-35; 1975.

2800 CHRONIC PANCREATITIS AND ITS TREATMENT. (Fre.) Bernades, P. (Service de gastroenterologie, Hopital Beaujon, 100, boulevard du General-Leclerc, 92110 Clichy, France). *Rev. Prat.* 26(6):423-426; 1976.

2801 ENZYME ACTIVITY IN ACUTE EXPERIMENTAL PANCREATITIS. (Rus.) Kriuchok, A. G.; Iusipova, N. A.; Bezkrovnaia, V. G. (Minsk Medical Inst., Minsk, USSR). *Klin. Khir.* (12):49-50; 1976.

2802 INCIDENCE OF PANCREATITIS [Abstract]. (Eng.) Chalmers, T. C. (Mount Sinai Medical Center, New York, NY 10029). *Lancet* 2(7947):1256-1257; 1975.

2803 ACUTE PANCREATITIS OBSERVED DURING OPERATION. (Eng.) Cumberland, V. H. (Royal North Shore Hosp., Sydney, Australia). *Chir. Gastroenterol.* 9(1):99-100; 1975.

2804 RECURRENT LOCALIZED CHRONIC PANCREATITIS ORIGINATING FROM THE CANAL. (Fre.) Loup, P.; Taillens, P.-A.; Ryncki, P. V.; Mosimann, R. (Hopital cantonal universitaire, CH-1011 Lausanne, Switzerland). *Helv. Chir. Acta* 42(1/2):197-200; 1975.

See also, 2504, 2509, 2547, 2775, 2781, 2782, 2791.

LIVER AND BILIARY TRACT

2805 SERUM BILE ACID CONCENTRATION AFTER A TEST MEAL. (Eng.) Fausa, O. (Natl. Hosp. Norway, Rikshospitalet, Oslo 1, Norway). *Scand. J. Gastroenterol.* 11(3):229-232; 1976.

Total serum bile acid concentrations were studied in six healthy subjects and in seven patients with hepatobiliary disease by an enzymatic-fluorimetric method employing a highly purified 3 α-hydroxysteroid dehydrogenase. In an additional 28 control subjects, mean total serum bile acid concentration was determined to be 2.5 μmol/l (standard deviation, 1.4). In the six healthy subjects, a significant postprandial increase in total serum bile acids occurred, with maximal values at 90 and 120 min after ingestion of a liquid test meal, and it returned to base-line levels within 3.5 hr. The maximal postprandial increase for each subject was(1.5-3 times the fasting value. In the seven patients with various hepatobiliary diseases, the maximal postprandial elevation of serum bile acids was higher than in the normals, and the duration of serum bile acid elevation was significantly prolonged, not returning to fasting level within 4 hr. In the patients with normal fasting concentration of bile acids, the postprandial elevation was also significantly greater than in the controls. A 2-hr postprandial sample seems suitable for the study of the bile acid test meal response for clinical use. It is concluded that the enzymatic fluorimetric procedure permits accurate and precise measurement and is simple enough to be used routinely for liver function analysis.

2806 CLASSIFICATION OF LIVER DISEASES BY CLINICAL CHEMICAL LABORATORY RESULTS AND CLUSTER ANALYSIS. (Eng.) Solberg, H. E.; Skrede, S.; Elgjo, K.; Blomhoff, J. P.; Gjone, E. (Rikshospitalet, Oslo 1, Norway). *Scand. J. Clin. Lab. Invest.* 36(1):81-85; 1976.

Seventy-eight patients with chronic liver disease were classified by cluster analysis, using only clinical chemical laboratory results. These results were compared with earlier findings, by discriminant analysis of laboratory results, which indicated that the classifications based on morphological (based mainly on biopsy findings) and functional criteria were consistent. Clinical diagnoses included chronic active hepatitis, chronic persistent hepatitis, alcoholic cirrhosis, cryptogenic cirrhosis, primary bilia cirrhosis (chronic liver diseases), acute hepatitis, and steatosis hepatitis. Although an exact correspon ence between the two systems of classification was no found, there was a strong tendency towards consistenc The greatest discrepancy between the two classificati systems was observed when patients who were primarily classified as having one of the five chronic liver di eases were clustered. Some of the causes for the discrepancies are discussed.

2807 REVERSED LIVER-SPLEEN RATIO AND THE NORMAL LIVER SPLEEN SCINTIGRAM. (Eng.) Harvey, W. C.; Kopp, D. T.; Podoloff, D. A.; Russell, D. C.; Brunstetter, F. L. (Presbyterian Hosp., 8200 Walnut Hill Lane, Dallas, TX 75231). *J. Reticuloendothel. Soc.* 19(1):19-27; 1976.

A liver-spleen phantom study was performed to determine the approximate ratio of spleen to liver activity necessary to make the spleen appear scintigraphically brighter than the liver. Liver scans were performed 20-30 min after injection of 2 mCi TcSC. Comparative scintigraphic brightness was evaluated from the anterior view. Plasma disappearance of the colloid was assessed by drawing blood 1-10 min after i.v. injections. The rate of uptake in the liver and spleen was determined in three patients by video-tape storer. Of 524 concurrent liver scans (408 showed malignancy), 24 showed the phenomenon of increased splenic uptake. Eighteen of these (75%) had a malignancy. Differences in $T_{1/2}$ plasma disappearance time and liver spleen uptake rates were not significant in patients with scintigraphically normal liver spleen scans as compared with patients with the "hot spleen" phenomenon. For equal thickness of tissue equivalent material (0.5 cm) between the liver and collimator, and the spleen and collimator, the spleen did not appear scintigraphically brighter until the total activity in the liver was 2.7 times that in the spleen. This corresponds to a concentration ratio for spleen to liver of 3.7:1. When the spleen had 2 cm more absorber than the liver between the collimator and phantom, the spleen appeared scintigraphically brighter, giving a liver to spleen activity ratio of 1:1. This corresponds to a spleen to liver concentration ratio of 5.3:1. Finally, for 4 cm more absorber between collimator and spleen than between collimator and liver, the spleen appeared scintigraphically brighter for a spleen to liver activity ratio of 1.4:1. This corresponds to a spleen to liver concentration ratio of 7.1:1. The data suggest that blood flow does not account for greater splenic than liver accumulation of colloid.

2808 LIVER IMAGING IN THE DIAGNOSIS OF HEPATIC VENOUS THROMBOSIS IN PAROXYSMAL NOCTURNAL HEMOGLOBINURIA. (Eng.) Staab, E. V.; Hartman, R. C.; Parrott, J. A. (Univ. North Carolina Sch. Medicine, Chapel Hill, NC 27514). *Radiology* 117(2): 341-348; 1975.

The use of liver imaging with technetium (^{99m}Tc) is reported in 11 cases of patients with paroxysmal nocturnal hemoglobinuria (PNH), 4 of whom also developed hepatic venous thrombosis (HVT). Liver imaging results correlated with pertinent clinical, radiologic, and pathologic findings in all cases. Six patients were alive, and four of them were treated with androgens and one with adrenocorticosteroids. Autopsy evidence in four cases showed multiple thromboses. Four cases of 8-16 yr duration had consistently normal liver images. Three cases showed consistently abnormal liver images for 5-6 yr. Liver imaging showed evidence of progressive HVP in four cases. A 59-yr-old man with a 5-yr history of PNH, during which his serum bilirubin continually rose, had image evidence of HVT and he subsequently died. A 54-yr-old man with a 10-yr history of PNH originally had a normal scan, but shortly before death, evidence of HVT appeared in the liver scan. Rapidly developing changes in the liver scan occurred in a 20-yr-old man who presented with pancytopenia 2 yr after spray painting his car in an enclosed space. At autopsy, only a single left hepatic vein was patent. A 25-yr-old woman died 12 yr after the diagnosis of PNH, as the result of HVT and pulmonary embolus. Her liver scan revealed evidence of HVT during an acute terminal episode. It is concluded that serial liver images are helpful in the diagnosis of HVT in PNH when considered in the clinical setting. Abnormal patterns include enlargement of the liver, especially of the right lobe, extrahepatic localization of radionuclide, and areas of decreased uptake in the distribution of the involved veins.

2809 LIVER ENLARGEMENT DEMONSTRATED BY SCINTIGRAPHY IN RHEUMATOID ARTHRITIS. (Eng.) Tiger, L. H.; Gordon, M. H.; Ehrlich, G. E.; Shapiro, B. (Albert Einstein Medical Center, Philadelphia, PA 19141). *J. Rheumatol.* 3(1):15-20; 1976.

Liver and spleen sizes were assessed in 32 patients with rheumatoid arthritis (RA), using scintigraphic techniques with technetium-99m sulfur colloid. Seven patients were shown to have enlarged livers, and three enlarged spleens. No correlation was found between splenomegaly and hepatomegaly and none was found between hepatomegaly and Sjogren's and Felty's syndromes (syndromes frequently present with RA). Hepatomegaly correlated best with increased titers of rheumatoid factor, suggesting increased reticuloendothelial activity in these patients. A less pronounced correlation existed between hepatomegaly and dysproteinemia. It is concluded that hepatomegaly may be a manifestation of RA and is, therefore, not necessarily an indication of adverse treatment results or of the development of lymphoproliferative disorders. In addition, scintigraphy provides a more exact assessment of liver size than does palpation or percussion, and it should be used in the diagnosis of RA.

2810 ENZYME ACTIVITIES IN HEPATIC VENOUS BLOOD UNDER STRENUOUS PHYSICAL EXERCISE. (Eng.) Fojt, E.; Ekelund, L.-G.; Hultman, E. (Silesian Sch. Medicine, PL-40-752 Katowice, Poland). *Pfluegers Arch.* 361(3):287-296; 1976.

The influence of physical exercise on liver function was investigated in 23 healthy volunteer men who were subjected to controlled major physical effort. Blood samples obtained by catheterization of the hepatic vein during exercise were analyzed for activities of LD (thermostabile and thermolabile isoenzymes), alanine aminotransferase (AlAT), sorbitol dehydrogenase (SDH), isocitrate dehydrogenase (ICD), alkaline phosphatase (AP), and activated creatine phosphokinase (CPK). These activities were compared with corresponding values in simultaneously taken arterial blood samples. In the LD test, there were no significant differences (NSD) between the two blood samples in three patients, while in three other patients, the hepatic venous activity was greater than systemic arterial activity. Two of these were at the significant level ($p<0.01$, $p<0.05$, and $p<0.05$). For the SDH there were three cases with NSD, while in the other three, hepatic venous activity was greater (two at the significant level, $p<0.01$ and $p<0.1$). In the ICD test, there was one case of NSD, and four cases of higher hepatic venous activity, three at the significant level ($p<0.05$, $p<0.1$, and $p<0.05$). There were no significant differences in any cases during the AP test. During the CPK test, there were three cases of NSD and one case in which the systemic arterial activity was greater than the hepatic venous activity ($p<0.01$). It is concluded that during intensive physical exercise some specific enzymes are released from the splanchnic area into the blood. In addition, exhausting exercise may induce an increased hepatocyte membrane permeability in man.

2811 EXCRETION OF LIVER ANTIGENS IN THE URINE OF PATIENTS WITH HEPATIC DISEASES. (Eng.)

Boss, J. H.; Rosenmann, E.; Dishon, T.; Slavin, S.; Eliakim, M. (Hebrew Univ.-Hadassah Medical Sch., B.O.B. 1172, Jerusalem, Israel). *Res. Exp. Med.* 167(1):51-59; 1976.

Hepatic damage in 42 patients with various liver disease was assessed by urinalysis for hepatic antigens. The tests that were performed in all patients and in seven healthy controls included serum bilirubin, SGOT, SGPT, vitamin B_{12}, prothrombin, alkaline phosphatase, cholesterol, albumin, globulin, Australia antigen, and antibody. Liver biopsies were performed in 14 patients and autopsies were done in 4 cases. Liver antigens were found in the unconcentrated urine of 4 of 42 patients with liver disease. There was no correlation between the presence or absence of liver antigens in the urine and the degree of liver function impairment. Nor was there a correlation with the duration or nature of the liver disease. Liver biopsies obtained at the time of urine sampling disclosed a significant difference between the five patients with negative urine and the three patients with positive urine. There was also a difference in the rate of mortality between antigen excretors and nonexcretors. Three of 38 patients with negative urine died; 2 with post-hepatitic cirrhosis died of massive gastrointestinal hemorrhage, and 1 with drug induced liver injury died of hepatic coma. Of the four antigen excretors, two succumbed to acute hepatic failure and the third, a cirrhotic patient, died of uremia due to proliferative glomerulonephritis. The results show that some patients with hepatic diseases excrete liver antigens in the urine. The number of antigen excretors disclosed was small and the urine of most patients, including those with severe jaundice and high SGOT levels, was negative. The presence of hepatic antigens correlated with parenchymal necrosis and was associated with a high mortality.

2812 STUDIES ON BILIARY BILE ACID METABOLISM IN HEPATO-BILIARY DISEASES. (Eng.)

Harada, T. (Dokkyo Univ. Sch. Medicine, Mibu, Shimotsuga, Tochigi Pref., 321-02 Japan). *Gastroenterol. Jpn.* 10(2):174-178; 1975.

Biliary bile acids were analyzed by thin-layer chromatography in 73 patients with various hepatobiliary diseases and in 12 patients without liver disease. The bile acids were divided into four types of glycine- and taurine-conjugates. The composition of biliary bile acid was different according to the degree of hepatic impairment, and the ratio of glycine-conjugate to taurine-conjugate (G/T ratio) was decreased in chronic liver diseases. The G/T ratio was 1.49 in the patients without liver disease, but it was 0.96 in the 11 patients with severe liver cirrhosis, and 1.38 in the 16 patients with chronic active hepatitis. In the three patient with acute hepatitis, the G/T ratio was low during the initial stage of the diseases, and it returned to a normal range upon recovery. There was also a decrease in the ratio of dihydroxycholic to cholic acid of biliary bile acid in patients with chronic liver diseases. It is concluded that the measuremen of bile acid in bile is valuable in the diagnosis of hepatic impairment.

2813 SERUM LEVELS OF C3 AND CHOLINESTERASE IN VARIOUS DISEASES OF THE LIVER. (Eng.)

Jorge, A. D.; Sanchez, D. (Internal Medicine Univ. Cuyo, Mendoza, Argentina). *Acta Hepatogastroenterol (Stuttg.)* 23(1):19-25; 1976.

The levels of complement fraction 3 (C 3), cholinesterase, albumin, and prothrombin were determined in 46 patients: 26 with liver cirrhosis, 9 with acute hepatitis, 6 with chronic aggressive hepatitis, 1 with chronic persistent hepatitis, and 4 with fatty liver. In all patients, and, particularl in those with cirrhotic liver, it was shown that the normal or pathological level of serum C 3 was related both qualitatively and quantitatively to the normal or pathological levels of cholinesterase, albumin, and prothrombin. The percentage in which the levels of these four parameters were pathologica was considerably higher in the cases with hepatic coma than in the cases without hepatic coma. The determination of the range of confidence for the four parameters showed that, in the patients with hepatic coma, cholinesterase reacted most sensitivel to liver damage (0.5-0.94) followed by C 3 and prothrombin (0.33-0.81). In cases without hepatic coma, cholinesterase was the most sensitive indicator (0.05-0.29), followed by prothrombin (0.03-0.24), albumin, and C 3 (0.00-0.16).

2814 PHENAZONE METABOLISM IN PATIENTS WITH LIVER DISEASE. (Eng.)

Andreasen, P. B.; Greisen, G. (Rigshospitalet, DK-2100 Copenhagen, Denmark). *Eur. J. Clin. Invest.* 6(1):21-26; 1976.

Phenazone metabolism was studied in 14 patients with liver disease (8 patients with cryptogenic or alcoholic cirrhosis, 2 patients with acute type A viral hepatitis, and 4 patients with drug-induced hepatitis), and in 6 normal volunteers. Phenazone (100 mg/ml) was administered i.v. over a period of 5 min at 15 mg/kg. In the controls, venous blood was drawn at 3, 4, 5, 7, 10, 13, and 24 hr after injection; in the patients, samples were drawn 3, 6, 9, 12, 24, and 48 hr after injection. In controls, urine was collected from 0-3, 3-6, 9-12, and 12-24 hr following administration; in the patients the periods were 0-24, 24-48, 48-72, and 72-96 hr. Phenazone and 4-hydroxyphenazone were determined by a gas-chromatographic method. The plasma and renal clearance of phenazone and the 4-hydroxyphenazone excretion in urine was significantly decreased in the patients with liver disease. The urinary excretion of 4-hydroxyphenazone was significantly correlated to the plasma clearance of phenazone ($r=+0.95$, $p<0.001$), to quantitative liver function as measured by the galactose elimination capacity ($r=+0.95$, $p<0.001$), and to the prothrombin values ($r=+0.82$, $p<0.001$). The determination of the 4-hydroxyphenazone excretion in urine may be used as an easy and noninvasive test of quantitative liver function.

2815 ASYMPTOMATIC LIVER DISEASE IN HAEMOPHILIACS.

(Eng.) Mannucci, P. M.; Capitanio, A.; Del Ninno, E.; Colombo, M.; Pareti, F.; Ruggeri, Z. M. (Via Pace 15, 20122 Milano, Italy). *J. Clin. Pathol.* 28(8):620-624; 1975.

The incidence of jaundice and of abnormal liver function tests was assessed in 75 patients with severe hemophilia A and in 16 patients with severe hemophilia B all of whom received multiple transfusion. Tests of hepatocyte function were within the normal range in the majority of patients. On physical examination, only five showed mild to moderate liver enlargement and two had hepatosplenomegaly. However, biliary cell function, liver cell damage, and bromsulphthalein retention tests gave high rates of abnormal values, which tended to increase with age. Hepatitis B surface antigen was present in seven patients and the corresponding antibody in 59 cases; 16 patients (14 with hemophilia A, 2 with hemophilia B) had a history of jaundice. All patients were asymptomatic, and only a minority showed clinical signs of liver involvement. These data suggest that in hemophiliacs, repeated and prolonged contact with the agent(s) responsible for posttransfusion hepatitis may cause chronic liver damage not associated with overt illness.

2816 LIVER DISEASE IN ALPHA$_1$-ANTITRYPSIN DEFICIENCY DETECTED BY SCREENING OF 200,000 INFANTS.

(Eng.) Sveger, T. (Malmo General Hosp., S-214 01 Malmo, Sweden). *N. Engl. J. Med.* 294(24):1316-1321; 1976.

The frequency and clinical characteristics of α_1-antitrypsin deficiency were studied prospectively in 200,000 newborn babies. One hundred and twenty Pi Z, 48 Pi SZ, 2 Pi Z-, and 1 Pi S-intants were identified and followed to the age of 6 months. Fourteen of 120 Pi Z infants had prolonged obstructive jaundice, nine with severe clinical and laboratory evidence of liver disease. Five had only laboratory evidence of liver disease. Eight other Pi Z infants had minimal abnormalities in serum bilirubin and hepatic enzyme activity and variable hepatosplenomegaly. All 22 Pi Z infants with hepatic abnormalities, two-thirds of whom were male, appeared healthy at 6 months of age. Ninety-eight Pi Z infants did not have clinical liver disease, but liver-function tests gave abnormal results in 44 of 84 at 3 months, and in 36 of 60 at 6 months of age. The number of infants who were small for their gestational age was greater ($p<0.001$) among those with clinical liver disease. None of the 48 Pi SZ infants had clinical liver disease, but 10 of 42 at 3 months and 1 of 22 at 6 months of age had abnormal liver function. The Pi Z and Pi SZ phenotypes are associated with covert or readily apparent hepatic dysfunction in the first 3 months of life. It is suggested that a level of α_1-antitrypsin above 40% of the normal one is of vital importance in protecting the liver tissue.

2817 HISTOPATHOLOGICAL STUDIES ON INTRAHEPATIC BILE DUCTS IN THE VICINITY OF PORTA HEPATIS IN BILIARY ATRESIA.

(Eng.) Chiba, T.; Kasai, M.; Sasano, N. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 118(3):199-207; 1976.

The pattern of bile ducts passing through the porta hepatis in biliary atresia was determined by histological examination of nine autopsy cases. Two types of bile ducts in the region of porta hepatis were distinguished. One group of patients had bile ducts with a large lumen connected with the extrahepatic duct; this pattern was seen in two cases of correctable type biliary atresia (I_a). The other pattern was achieved by many small bile ducts presumably originating from large lobular or segmental bile ducts. They usually measured less than 40 microns in diameter, and were lined by columnar epithelium. This pattern was observed in six cases of non-correctable type biliary atresia. In another case, there were several large bile ducts associated with many small ones. These large bile ducts were probably produced by rapid growth of ducts due to active bile flow after operation, because visible bile ducts were not found at porta hepatis during operation. Cholangitis may also affect the histologic findings of bile ducts at the porta hepatis. It is suggested that the patterns of bile ducts may be modified by some exogenous factors such as postoperative bile flow and ascending cholangitis.

2818 CHOLESTASIS IN INFANCY: STATUS REPORT AND CONCEPTUAL APPROACH.

(Eng.) Javitt, N. B. (New York Hosp.-Cornell Medical Center, New York, NY). *Gastroenterology* 70(6):1172-1181; 1976.

Disturbances in bile flow that occur early in life are reviewed. Cholestasis may result from anatomic or functional abnormalities. Causes of the former include extrahepatic biliary atresia and choledochal cysts. Functional abnormalities may be caused by primary bile secretory failure or secondary failure. Causes of the former include persistent intrahepatic cholestasis (familial and nonfamilial types) and recurrent cholestasis. Secondary bile secretory failure may result from infection, cystic fibrosis, anatomic abnormalities of the gastrointestinal tract, metabolic errors, and α-1-antitrypsin deficiency. Effective therapy depends upon distinguishing between anatomic and physiological abnormalities. In cholestasis with patent bile ducts, medical therapy attempts to increase canalicular bile flow, and mechanisms of increasing bile acid-dependent flow and bile acid-independent flow are discussed. The role of surgery in the management of cholestatic syndromes with patent bile ducts is considered from both the diagnostic and therapeutic viewpoints. When the problem is correctly identified, it is suggested that early diagnosis and medical therapy will prove more efficacious than surgery.

2819 BILE SALT GLUCURONIDES: IDENTIFICATION AND QUANTITATIVE ANALYSIS IN THE URINE OF PATIENTS WITH CHOLESTASIS.

(Eng.) Frohling, W.; Stiehl, A. (Medizinische Universitatsklinik, Bergheimer Strasse 58, D-6900 Heidelberg, W. Germany). *Eur. J. Clin. Invest.* 6(1):67-74; 1976.

Glucuronides of lithocholate, chenodeoxycholate, and cholate were synthesized enzymatically and characterized by thin layer chromatography, column chromatography, and specific enzymatic hydrolysis. Bile salt glucuronides were quantitatively analyzed in the urine of 10 patients with intra- and 10 patients with extra-hepatic cholestasis and were found to be present in 19 patients. The patients with intrahepatic cholestasis excreted 8.9 mg nonsulfated and nonglucuronidated bile salts, 18.2 mg sulfated bile salts, and 7.2 mg glucuronidated bile salts. The patients with extrahepatic cholestasis excreted 14.7 mg nonsulfated and nonglucuronidated bile salts, 20.7 mg sulfated bile salts, and 4.7 mg glucuronidated bile salts. In five healthy subjects, only trace amounts of bile salt glucuronides were detected. The findings indicate that glucuronidation of bile salts occurs in man and represents a metabolic pathway in patients with cholestasis.

2820 TREATMENT OF PRURITUS IN CHOLESTASIS OF PREGNANCY WITH A NEW ANION EXCHANGE RESIN (SECHOLEX).

(Eng.) Samsioe, G.; Johnson, P.; Gustafson, A. (Sahlgren's Hosp., Univ. Goteborg, Goteborg, Sweden). *Acta Obstet. Gynecol. Scand.* 54(4):333-340; 1975.

A new bile acid sequestrant poly-2(diethylamino)-ethyl) polyglycerylene dextran hydrochloride (PDX chloride, Secholex) was evaluated for the relief of pruritus in cholestasis of pregnancy (CP) in 31 women. CP was verified by the presence of abnormal lipoprotein X in serum. The clinical series was divided into two degrees of severity based on liver function tests, pruritus gravidarum (PG, 14 patients) and hepatosis of pregnancy (HP, 17 patents). Eleven of 31 women discontinued treatment because of gastrointestinal side effects. Of the 20 women continuing the study for more than 1 week, all with a milder form of cholestasis, PG (8 patients), experienced relief of pruritus, while some relief was obtained in 75% of the women with HP. In women with HP, serum alkaline phosphatase increased by 35% ($p<0.05$) after 4 weeks, while Simplastin A values fell concomitantly ($p<0.05$). In HP, serum cholesterol decreased by 10% ($p<0.05$) after 1 week of PDX chloride administration, but, thereafter, it tended to rise again. LP-X levels were lower ($p<0.05$) in the women with HP treated with PDX chloride for 4 weeks. In six patients the serum concentration of folic acid decreased ($p<0.05$) after 4 weeks of treatment. After 2 weeks of treatment, there was a higher 16:0 palmitic acid and a lower 18:0 stearic acid relative (and absolute) fatty acid content of serum lecithin. There was no effect on the essential fatty acids, 18:2 (linoleic acid) and 20:4 (arachidonic acid). An expected reduction in serum cholesterol levels, which are characteristically increased in CP, was not achieved by the administration of PDX chloride. Its effect on the fatty acid composition of serum lecithin suggests that it influences the basic defect of CP.

2821 HEPATIC GRANULOMAS IN LEPROSY: THEIR RELATION TO BACTEREMIA.

(Eng.) Chen, T. S. N.; Drutz, D. J.; Whelan, G. E. (Veterans Admin. Hosp., East Orange, NJ 07019). *Arch. Pathol. Lab. Med.* 100(4):182-185; 1976.

The clinicopathologic spectrum of hepatic involvement in various stages of leprosy and the relationship of bacteremia to the occurrence of hepatic granuloma were studied in 28 patients with leprosy. Of these patients, 12 had lepromatous (LL) leprosy, 6 had LL leprosy with erythema nodosum leprosum (ENL), 2 had borderline lepromatous (BL) leprosy, 3 had borderline (BB) leprosy, and 5 had borderline tuberculoid (BT) leprosy. None of the patients exhibited signs or symptoms of liver disease (jaundice, hepatomegaly, ascites, portal hypertension, or hepatic encephalopathic features), except for one patient with LL leprosy and ENL who concurrently contracted serum hepatitis. Hepatic dysfunction was absent, except for delayed BSP clearance (<10% retention) in 5 of 11 patients with LL leprosy, in 6 of 6 patients with LL leprosy and ENL, in 1 of 3 patients with BB leprosy, and in 1 of 5 patients with BT leprosy. Seven of 24 patients (5 with LL leprosy) were positive for hepatitis B surface antigen (HBsAg). Elevated titer for HBsAg antibody was found in two patients. Forty-one liver biopsies in the 28 patients confirmed that 21 had hepatic granulomas: 1 of 5 with BT, 2 of 3 with BB, 2 of 2 with BL, 10 of 12 with LL, and 6 of 6 with LL leprosy and ENL. The granulomas in BT leprosy were histiocytic in appearance. In BB leprosy, they were epithelioid and histiocytic. In BL leprosy, they were histiocytic and foam cell and in LL leprosy, or LL leprosy with ENL, all three types were found, although foam cell was most common. Epithelioid cell infiltrates were rimmed by lymphocytes, lacked caseation necrosis, and contained few or no acid-fast bacilli (AFB). This contrasted with the profusion of *Mycobacterium leprae* in foam cell lesions. Histiocytic lesions consisted of histiocytes clustered around swollen hepatocytes; AFB were absent. Hepatic granulomas increased in number as the mycobacterial infection intensified; *M. leprae* was found in 0 of 5 patients with BT, in 1 of 3 patients with BB, in 2 of 2 patients with BL, in 4 of 6 patients with LL leprosy with ENL, and in 9 of 12 patients with LL. AFB were seen in hepatic sinusoids and Kupffer cells in 13 of the 28 cases. Additional findings included mild to moderate fat in 11 patients, mild portal fibrosis in 9, mild focal necrosis and inflammation in 6, and the presence of glycogenated liver cell nuclei in 13 of 28 patients. Hepatic involvement varied with the severity of cutaneous infection and with the frequency and intensity of bacteremia. It is estimated that 1,000-10,000 AFB per milliliter of blood are required to generate the hepatic infiltrates.

2822 MALIGNANT HEPATOMA ASSOCIATED WITH ACQUIRED HEPATIC CUTANEOUS PORPHYRIA. (Eng.)

Keczkes, K.; Barker, D. J. (Hull Royal Infirmary, Hull, HO3 2JZ, England). *Arch. Dermatol.* 112(1): 78-82; 1976.

The case of a 60-yr-old woman with a 3-yr history of acquired hepatic cutaneous porphyria is presented. The patient presented with the characteristic cutaneous manifestations such as hyperpigmentation, photosensitivity, excessive blistering of hands and fingers, and hypertrichosis; these lesions were aggravated by exposure to sunlight. The patient did not have elevated urinary levels of porphyrin; however, fecal levels were elevated. Although a nonresectable hepatoma of low-grade malignancy was discovered in the right lobe of the liver, liver function was not altered. The patient was treated with fluorouracil (total of 13.25 g) perfused through a hepatic artery catheter. The treatment did not affect fecal levels of porphyrin, but the patient was ambulatory, 1 yr after beginning treatment. It is concluded that surgical removal of the primary hepatic tumor should be the first choice of treatment, when possible, but that infusion with fluorouracil prolongs life and causes little discomfort and few side-effects.

2823 EVALUATION OF THE LIGATION OF THE HEPATIC ARTERY AND REGIONAL ARTERIAL CHEMOTHERAPY IN THE TREATMENT OF PRIMARY AND SECONDARY CANCER OF THE LIVER. (Eng.)

Mokka, R. E. M.; Larmi, T. K. I.; Huttunen, R.; Kairaluoma, M. I. (Univ. Central Hosp., SF-90220 Oulu 22, Finland). *Ann. Chir. Gynaecol. Fenn.* 64(6):347-352; 1975.

The use of hepatic artery ligation and regional arterial chemotherapy in the treatment of primary and secondary liver cancer was evaluated in 23 patients; 12 of these patients underwent hepatic artery catheterization, and 5 were also given regional arterial chemotherapy with 5-fluorouracil beginning 2 days after ligation. The survival time correlated well with the amount of tumor tissue in the liver. Ligation of the hepatic artery prolonged the survival time of the operated patients, when compared with 15 untreated patients, and it also yielded good palliation. The hospital mortality was 13%. Three of the surviving patients were treated with ligation only, and their survival time was apparently longer than that for those treated simultaneously with chemotherapy. It is concluded that ligation of the hepatic artery is a valuable adjunct to the palliative treatment of malignant liver tumors. In selected cases, liver resection, 2-4 months after ligation yields the best and most longlasting palliation.

2824 CYTOLOGY AND CYTOGENESIS OF NEOPLASTIC (HYPERPLASTIC) HEPATIC NODULES. (Eng.)

Bannasch, P. (Institut fur Experimentelle Pathologie am Deutschen Krebsforschungszentrum, 69-Heidelberg, Im Neuenheimer Feld 280, W. Germany). *Cancer Res.* 36(7):2555-2562; 1976.

Information concerning the cytology and cytogenesis of neoplastic hepatic nodules is reviewed. Cytochemical and electron microscopic investigations of neoplastic nodules, induced in the rat liver by nitrosomorpholine or thioacetamide, show that most neoplastic nodules are comprised of a heterogeneous cell population. At least four different types of altered hepatocytes can be distinguished: "clear" glycogen storage cells with a dislocation and reduction of the granular endoplasmic reticulum, "acidophilic" glycogen storage cells with a hypertrophy of the agranular endoplasmic reticulum, fat-storing cells, and basophilic cells deficient in glycogen and rich in ribosomes. In addition, there are diverse intermediate cell types. The cytochemically demonstrable activity of glucose-6-phosphatase is reduced in most neoplastic nodules, but it may also be normal or even increased. The clear and the acidophilic cells precede the development of the neoplastic nodules by weeks and months. They usually form foci, which are taken to be preneoplastic lesions. During the formation of neoplastic nodules and hepatocellular carcinomas originating from such foci, the glycogen of the clear and the acidophilic cells is progressively reduced, whereas the number of ribosomes (basophilia) increases. This process, which may be accompanied by a transitory accumulation of fat, leads to the evolution of basophilic carcinoma cells. It is concluded that the majority of the neoplastic nodules consist of a mixture of precancerous, definitely cancerous, and diverse intermediate cells. Neoplastic nodules in which basophilic cells prevail may already be carcinomas. Although the neoplastic nodules seem to be a frequent precursor of hepatocellular carcinomas, the latter may also develop without going through the nodule stage.

2825 STUDIES ON THE PATHOPHYSIOLOGY OF ENCEPHALOPATHY IN REYE'S SYNDROME: HYPERAMMONEMIA IN REYE'S SYNDROME. (Eng.)

Shannon, D. C.; De Long, R.; Bercu, B.; Glick, T.; Herrin, J. T.; Moylan, F. M. B.; Todres, I. D. (Massachusetts General Hosp., Boston, MA 02114). *Pediatrics* 56(6):999-1004; 1975.

Acid-base relations in the blood and cerebrospinal fluid of 16 children with Reye's syndrome, 8 of whom survived, were compared. The initial acid-base status of the eight survivors was characterized by acute respiratory alkalosis (pCO_2= 32 mm Hg; HCO_3^-= 22.0 mEq/1), while that of the eight children who died was associated with metabolic acidosis as well (HCO_{3-}=10.0 mEq/1). Arterial-internal jugular venous ammonia concentration differences on day 1 (299 mg/100 ml) and day 2 (90 mg/100 ml) reflected cerebral uptake of ammonia while those on days 3 and 4 (-43 and -55 mg/100 ml) demonstrated cerebral release. Arterial blood hyperammonemia was detoxified safely in the brain as long as the levels did not exceed approximately 300 μg/100 ml. Beyond that level, lactic acidosis was observed, particularly in cerebral venous drainage. Arterial blood hyperammonemia was also related to the extent of alveolar hyperventilation. These findings are very similar to those seen in experimental hyperammonemia and support the concept that neurotoxicity in children with Reye's syndrome is at least partly due to impaired oxidative metabolism secondary to hyperammonemia.

2826 REYE SYNDROME WITH ASSOCIATED INFLUENZA A AND B INFECTION. (Eng.) Ruben, F. L.; Michaels, R. H. (Montefiore Hosp., 3459 Fifth Ave., Pittsburgh, PA 15213). *JAMA* 234(4):410-412; 1975.

Two groups of children treated for Reye's syndrome, 13 in 1974 and 6 in 1975, were studied for laboratory evidence of concomitant viral infection. Influenza B/Hong Kong was isolated from the pharynx in four of nine 1974 cases. One child had just recovered from varicella; adenovirus type 2 and respiratory syncytial virus were isolated from two additional patients. Serologic tests for influenza suggested concomitant or recent influenza B infection in 10 of the 13 cases. Influenza A/Port Chalmers was recovered from three of the six 1975 cases, and all six showed significant antibody rises to influenza A. It is suggested that influenza viruses provide a trigger mechanism for the development of Reye's syndrome in susceptible children.

2827 JUVENILE WILSON DISEASE: HISTOLOGIC AND FUNCTIONAL STUDIES DURING PENICILLAMINE THERAPY. (Eng.) Grand, R. J.; Vawter, G. F. (300 Longwood Ave., Boston, MA 02115). *J. Pediatr.* 87(6):1161-1170; 1975.

Seven patients who were being treated for juvenile Wilson's disease with penicillamine were studied 2-7 yr after the onset of drug treatment. All were without symptoms at follow-up. By comparison to initial biopsies (4 patients), post-treatment specimens showed either considerable reduction in portal fibrosis (2 patients) or no significant change (2 patients); portal inflammation and necrosis were greatly diminished or absent in three patients. Complete restitution of normal architecture was not seen in any of the patients. Three patients lacked initial biopsies. In these, portal cirrhosis, inflammation and necrosis, and fatty vacuolization of the hepatocytes were present 3, 5, and 7 yr after the onset of therapy. Lipofuscin pigment was abundant in follow-up biopsies. The data indicate that penicillamine produces clinical improvement and long-term survival in patients with Wilson's disease, when treatment is initiated early in the course of illness. In addition, it is concluded that morphologic improvement is achieved in some patients with Wilson's disease, following treatment with penicillamine, but that this is not predicted by biochemical factors. Sequential biopsies are necessary to evaluate completely the extent of healing.

2828 ALPHA-1 ANTITRYPSIN DEFICIENCY IN LIVER DISEASE. (Fre.) Brochard, C. (Hopital Franco-Musulman, 93009 Bobigny, France). *Sem. Hop. Paris* 51(15):1019-1024; 1975.

Literature on adult and childhood liver diseases caused by the congenital absence of the enzyme α-1-antitrypsin enzyme is reviewed. Histologically, PAS positive intracytoplasmic globules are present in the hepatocytes of patients with liver disease and are thought to result from an accumulation of the enzyme. The disease in infants appears initially as a neonatal jaundice, which progresses to cirrhosis and portal hypertension. α-1-Antitrypsin deficiency has also been reported in cases of adult hepatic diseases, frequently with pulmonary emphysema. In several cases, cirrhosis was discovered at autopsy after patients died of their pulmonary ailment. In adult or infant diseases, the cirrhosis is extremely variable and may be micro- or macronodular or fibrotic. Treatment with phenobarbital or estrogen has proven most effective.

2829 CHOLESTASIS (A PERMANENT CHALLENGE IN DIAGNOSIS). (Por.) da Costa Gayotto, L. C. (Dept. de Patologia, Universidade de Santa Catarina, Florianopolis, SC, Brazil). *Arq. Gastroenterol.* 12(4):223-226; 1975.

2830 SCRATCH AUSCULTATION OF THE LIVER. (Ger.) Karobath, H. (II. Medizinische Abteilung, Krankenanstalt Rudolfstiftung, A-1030 Vienna, Boerhavegasse 13, Austria). *Dtsch. Med. Wochenschr.* 101(6):207-208; 1976.

2831 HETEROTOPIC LIVER TRANSPLANTATION (LITERATURE REVIEW). (Rus.) Rozental', R. L.; Zhuravlev, S. Ia. (Riga Medical Inst., Riga, USSR). *Khirurgiia (Mosk.)* (1):133-137; 1976.

2832 EFFECT OF MORSHIN MINERAL WATERS ON THE FUNCTIONAL STATUS OF THE LIVER AND OF THE EXTRAHEPATIC BILE DUCTS. (Rus.) Storozhenko, N. A. ("Dnestr" Sanatorium, Morshin, USSR). *Vrach. Delo* (1):52-53; 1976.

2833 TWO CASES OF HEPATOCHOLANGIOMA. (Ita.) Marciandi, C.; Raschi, P. (I Divisione Medica, Ospedale di Circolo, Rho, Italy). *Clin. Ter.* 73(5):475-482; 1975.

2834 CLINICAL REVIEW OF IMMUNE DISTURBANCES IN LIVER DISEASES. (Spa.) Yuguero del Moral, L.; Garcia Cabezas, J.; Fernandez-Cruz, A. (Hospital Clinico de la Facultad de Medicina, Universidad Complutense de Madrid, Madrid, Spain). *Rev. Clin. Esp.* 138(1):1-6; 1976.

2835 CLOTTING CHANGES IN LIVER DISEASE. (Spa.) Sempe, J.; Anaya, R.; Wolpert, E. (Facultad Medicina, UNAM, Mexico City, Mexico). *Rev. Invest. Clin. (Mex.)* 27(3):159-163; 1975.

2836 APPLICATION OF A MECHANIC SUTURE IN OPERATIONS ON THE LIVER AND BILE DUCTS. (Rus.) Vinogradov, V. V.; Ryneisky, S. V.; Zenonos, A. (Dept. Surgery, Patrice Lumumba Univ., Moscow, USSR). *Vestn. Khir.* 114(4):40-44; 1975.

2837 BLOOD SUPPLY AND THE FUNCTION OF THE LIVER AND ERYTHREMIA. (Rus.) Fomichev, V. I. (Moscow Medical Inst. Stomatology, Moscow, USSR). *Ter. Arkh.* 46(8):106-108; 1974.

2838 METABOLISM OF BILE SALTS AND ITS PATHOPHYSIOLOGICAL SIGNIFICANCE. (Por.) Correia, J. P.; Areias, M. A.; Menezes, M. L. (Facultade de Medicine, Lisbon, Portugal). *J. Med. (Lisboa)* 87(1641): 113-118; 1975.

2839 CLINICAL TREATMENT OF ACUTE LIVER FAILURE BY EXTRACORPOREAL LIVER PERFUSION. (Rus.) Dubrovsky, A. K.; Aslanyan, A. V.; Khramov, R. N. (Tyumen Medical Inst., Tyumen, USSR). *Khirurgiia* (1):71-75; 1975.

2840 SOME INDICES OF THE FUNCTIONAL CONDITION OF THE THYROID GLAND IN PATIENTS WITH CHRONIC HEPATITIS AND LIVER CIRRHOSIS. (Rus.) Shlimovich, P. B. (Ivanovo Medical Inst., Ivanovo, USSR). *Klin. Med. (Mosk.)* 53(2):42-45; 1975.

2841 TREATMENT OF HEPATOCEREBRAL INSUFFICIENCY. (Rus.) Galperin, E. I.; Nekludova, E. A.; Volkova, N. N.; Stetsyuk, A. G.; Ushakova, M. D.; Kauricheva, N. I.; Derevyanko, V. P. (Inst. Tissue and Organ Transplantation, Moscow, USSR). *Khirurgiia* (1):62-71; 1975.

2842 COMPARATIVE DATA CONCERNING THE INTRAHEPATIC AND INTRACARDIAC HEMODYNAMICS IN CHILDREN WITH MITRAL DEFECTS OF THE HEART BEFORE AND AFTER THEIR SURGICAL TREATMENT UNDER CONDITIONS OF EXTRACORPOREAL CIRCULATION. (Rus.) Krasina, G. A.; Serbin, V. I.; Azizova, D. S. (Inst. Pediatrics, USSR Acad. Medical Sciences, Moscow, USSR). *Vopr. Okhr. Materin. Det.* 20(4):46-50; 1975.

2843 STATUS OF LIVER FUNCTION DURING THE POSTOPERATIVE PERIOD IN CHILDREN. (Rus.) Chernobel'skii, A. M.; Mikhel'son, V. A. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Pediatriia* (11):65-66; 1975.

2844 ENZYMATIC INDUCTION OF HEPATOCYTES BY PHENOBARBITAL: APPLICATIONS TO THE TREATMENT OF JAUNDICE. (Fre.) Nusinovici, V.; Darnis, F.; Levy, V. G.; Caroli, J. (Hopital Saint-Antoine, 184, rue du fg Saint-Antoine, 75012 Paris, France). *Entretiens Bichat Ther.* 1975:149-152.

2845 ANGIO-ARCHITECTURE OF NORMAL AND PATHOLOGICAL HUMAN LIVER. (Ger.) Albrecht, F.; Irmscher, J. (Medizinische Akademie "Carl Gustav Carus," Dresden, E. Germany). *Wiss. Z. Friedrich Schiller Univ. Jena Math. Naturwiss. Reihe* 24(2/3): 245-248; 1975.

2846 AMOEBIC LIVER ABSCESS PRESENTING AS OBSTRUCTIVE JAUNDICE: A CASE REPORT. (Eng.) Haider, Z.; Rasul, A.; Ahmad, I. (Fatima Jinnah Medical Coll., Lahore, Pakistan). *J. Trop. Med. Hyg.* 78(6):131-132; 1975.

2847 CHRONIC LIVER DISEASES AND IMMUNOLOGICAL ABNORMALITIES [Abstract]. Sambe, K.; Tsuchiya, M.; Kamegaya, K.; Asakura, H.; Shimabukuro, K.; Ishii, H.; Takahashi, H.; Oda, M.; Ishii, K.; Matsuzaki, S.; et al. (Sch. Medicine, Keio Univ., Tokyo, Japan). *Jpn. J. Med.* 13(4):302-303; 1974.

2848 HEMANGIOMA OF THE LIVER: REPORT OF TWO CASES. (Eng.) Jensen, J. Th.; Klinge, T. (Kommunehospitalet, DK-8000 Aarhus, Denmark). *Acta Radiol. (Stockh.)* 17(1):61-68; 1976.

2849 VISCERAL ANGIOGRAPHY: A COMMUNITY HOSPITAL EXPERIENCE. (Eng.) Kohn, B. J.; Weinstein, E. C. (Granada Hills Community Hosp., 6844 Sepulveda Boulevard, Van Nuys, CA 91405). *Int. Surg.* 61(3): 141-145; 1976.

2850 INTRAHEPATIC ANEURYSM AND HEMOBILIA. (Eng.) Thorlakson, R. H. (Winnipeg Clinic, 425 St. Mary Ave., Winnipeg, Canada R3C 0N2). *Int. Surg.* 61(3):135-138; 1976.

2851 SERUM PROTEINS IN DISEASES OF THE LIVER. (Eng.) Skrede, S.; Blomhoff, J. P.; Elgjo, K.; Gjone, E. (Rikshospitalet, Univ. Hosp., Oslo, Norway). *Clin. Lab. Invest.* 35(5):399-406; 1975.

2852 VITAMIN E DEFICIENCY AND PLATELET FUNCTIONAL DEFECT IN A JAUNDICED INFANT. (Eng.) Khurshid, M.; Lee, T. J.; Peake, I. R.; Bloom, A. L. (Univ. Hosp. Wales, Cardiff, DF4 4XW, Scotland). *Br. Med. J.* 4(5987):19-21; 1975.

2853 AMOUNT AND RATE OF DISAPPEARANCE OF LIVER FAT IN MALNOURISHED INFANTS IN JAMAICA. (Eng.) Waterlow, J. C. (London Sch. Hygiene Tropical Medicine, Keppel St., London WC1E 7HT, Great Britain). *Am. J. Clin. Nutr.* 28(11):1330-1336; 1975.

2854 AMEBIC LIVER ABSCESS IN VIETNAM RETURNEES: REPORT OF FOUR CASES. (Eng.) Stotka, V. L. (Naval Regional Medical Center, Camp Lejeune, NC). *N.Z. Med. J.* 36(10):607-612; 1975.

See also, 2314, 2405, 2417, 2499, 2501, 2516, 2532, 2533, 2534, 2535, 2633, 2674, 2674, 2765, 2785, 2858, 2892, 2897, 2915, 2924, 2955, 2958, 2987, 3018.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

2855 BILIRUBIN SECRETION AND CONJUGATION IN THE CRIGLER-NAJJAR SYNDROME TYPE II. (Eng.) Gordon, E. R.; Shaffer, E. A.; Sass-Kortsak, A. (Division Gastroenterology, McGill Univ., Montreal, Canada). *Gastroenterology* 70(5):761-765; 1976.

Bilirubin secretion and conjugation was studied in a case of Crigler-Najjar syndrome (type II) in a 15-yr-old boy with severe congenital unconjugated hyperbilirubinemia. Bilirubin encephalopathy developed only during early puberty after surgery and fasting, coincident with a dramatic rise in serum bilirubin, which responded to intensive therapy. Fasting increased markedly the serum bilirubin levels and, probably was a major factor in precipitating the initial acute event. One year later, while the patient was in a metabolic steady state, the secretion rate of bilirubin was measured by a duodenal marker-perfusion technique, and the nature of the secreted bilirubin conjugates was characterized. Total bilirubin secretion rates were low, 4.39 mg/hr and 4.44 mg/hr on two separate studies. The major pigment detected in bile was bilirubin monoglucuronide. Bilirubin diglucuronide comprised only a minor fraction of the pigments, and other conjugates were not detected. The results document a reduced biliary bilirubin secretion and suggest that the addition of the second glucuronic acid moiety to the bilirubin molecule may be defective in Crigler-Najjar syndrome (type II).

2856 THE EFFECT OF REPEATED PHLEBOTOMY ON BILIRUBIN TURNOVER, BILIRUBIN CLEARANCE AND UNCONJUGATED HYPERBILIRUBINAEMIA IN THE CRIGLER-NAJJAR SYNDROME AND THE JAUNDICED GUNN RAT: APPLICATION OF COMPUTERS TO EXPERIMENTAL DESIGN. (Eng.) Berk, P. D.; Scharschmidt, B. F.; Waggoner, J. G.; White, S. C. (Building 10, Room 4D-52, Natl. Inst. Health, Bethesda, MD 20014). *Clin. Sci. Mol. Med.* 50(5): 333-348; 1976.

A multicompartmental model of erythrokinetics and bilirubin production was developed to predict the consequences of chronic phlebotomy on daily bilirubin turnover. Control values for four physiological variables including bilirubin turnover were determined in a 20-yr-old woman with type 1 congenital nonhemolytic jaundice (Crigler-Najjar syndrome). With these base-line data, the model predicted the following changes during phlebotomy: a 34% fall in bilirubin turnover, a 240% increase in the hemoglobin content of bone marrow erythroid precursors, a 25% fall in the half-life of ^{51}Cr-labeled RBC, and a characteristic alteration of the RBC survival curve after labeling with [2-^{14}C]glycine. On the assumption that hepatic bilirubin clearance was independent of turnover and would therefore remain unchanged, a fall in plasma unconjugated bilirubin concentration during phlebotomy from 436 to 282 μmol/l was expected. The patient underwent phlebotomy (350 ml/week for 2 months, and 500 ml/week during an additional 3 months). Appropriate studies during phlebotomy confirmed each of the above predictions. Turnover fell by 31%. Plasma unconjugated bilirubin remained essentially unchanged. Analogous results were observed in phlebotomized jaundiced Gunn rats. Kinetic studies in both the patient and the rats demonstrated that the failure of plasma unconjugated bilirubin to fall in parallel with bilirubin turnover resulted from a prolongation of the terminal half-life of radioactively labeled bilirubin and a fall in bilirubin clearance in every instance. These studies indicate that in congenital nonhemolytic jaundice, bilirubin clearance is uniquely influenced by bilirubin turnover, and that compartmental modeling and kinetic studies are useful for predicting and interpreting the results of both physiological experiments and experimental therapeutic regimens.

2857 COPROPORPHYRIN ISOMERS IN DUBIN-JOHNSON SYNDROME. (Eng.) Kondo, T.; Kuchiba, K.; Shimizu, Y. (Uwajima City Hosp., Uwajima City, Ehime, Japan). *Gastroenterology* 70(6):1117-1120; 1976.

To study abnormal porphyrin metabolism in Dubin-Johnson syndrome (DJS), coproporphyrin isomer distribution in urine and bile was investigated in 27 carriers, and in 29 patients with DJS. Urinary total coproporphyrin content in patients with DJS exceeded that of 23 normal controls ($p<0.01$). However, the increase in urinary excretion of total coproporphyrin was of a much lesser degree compared with an increase in urinary total coproporphyrin reported for erythropoietic porphyria in which a deficiency of uroporphyrinogen III cosynthetase was demonstrated. Urinary total coproporphyrin content in carriers was significantly less than that of normal controls ($p< 0.05$). This paradoxical decrease of urinary total coproporphyrin concentration in DJS carriers was observed in consequence of a decrease in coproporphyrin III excretion without concomitant increase in type I isomer. Administration of griseofulvin, in the dose that had been shown to precipitate attacks of acute porphyria in susceptible subjects (0.5-0.75 g, 7 days), to two carriers and four patients with DJS, did not elicit clinical signs suggestive of porphyria; urinary total coproporphyrin concentration and the percentage of coproporphyrin I remained unchanged. These results demonstrate an aspect of DJS that is not consistent with the hypothesis that a partial defect in uroporphyrinogen III cosynthetase of the liver may be the cause of DJS. Coproporphyrin in the bile of DJS patients was preponderantly type I.

2858 BILIARY EXCRETION OF CONJUGATED SULFOBROMOPHTHALEIN (BSP) IN CONSTITUTIONAL CONJUGATED HYPERBILIRUBINEMIAS. (Eng.) Abe, H.; Okuda, K. (Kurume Univ. Sch. Medicine, Kurume, Japan). *Digestion* 13(5):272-283; 1975.

BSP and its three major conjugates were determined in bile or duodenal aspirate, plasma, and urine following i.v. administration of free BSP (5 mg/kg) and synthetic BSP-glutathione (BSP-GSH, 6.8 mg) in five patients with the Dubin-Johnson syndrome and in two patients with the Rotor syndrome, using alumina column chromatography. In Dubin-Johnson patients, the biliary excretion of conjugated BSP was selectively impaired; conjugated BSP increased in plasma, replacing free BSP after 30 min, and plasma retention of BSP-GSH was greater than that of free BSP when administered i.v. In contrast, biliary excretion of BSP and its conjugates was not impaired, and regurgitation of conjugated BSP into plasma was minimal in the Rotor syndrome. Thus, these two constitutional hyperbilirubinemias can be distinguished by their basic defects in BSP metabolism.

2859 BREAST MILK JAUNDICE: IN VITRO INHIBITION OF RAT LIVER BILIRUBIN-URIDINE DIPHOSPHATE GLUCURONYLTRANSFERASE ACTIVITY AND Z PROTEIN-BROMOSULFOPHTHALEIN BINDING BY HUMAN BREAST MILK. (Eng.) Foliot, A.; Ploussard, J. P.; Housset, E.; Christoforov, B.; Luzeau, R.; Odievre, M. (Unite de Recherches de Biologie Animale et Techniques Experimentales, INSERM, Paris, France.) *Pediatr. Res.* 10(6):594-598; 1976.

Twenty-four samples of breast milk from nine mothers of infants with breast milk jaundice were studied to determine their ability to inhibit bilirubin conjugation and BSP binding to hepatic Z and Y protein in Sprague-Dawley rat liver homogenates. Eight samples of milk from mothers of nonjaundiced infants and five formula milks enriched with polyunsaturated fatty acids served as controls. Milk from mothers with jaundiced infants was able to inhibit bilirubin conjugation *in vitro* as well as BSP binding to hepatic Z protein, whereas the controls were not. The inhibitory activity was maximal after storage at 4 C for 96 hr and it was destroyed by heating at 56 C for 15 min. Under these conditions, bilirubin conjugation was inhibited by 80.3%, and BSP binding to Z protein was inhibited by 82.1%. There was no effect on BSP binding to Y protein. Pathologic breast milk inhibited BSP-Z protein binding only when stored under conditions that also caused bilirubin conjugation inhibition *in vitro* as well as the liberation of nonesterified fatty acids. Thus, the appearance of this inhibitory capacity *in vitro* seems to be linked to the lipolytic activity particular to pathologic milks.

2860 DUBIN-JOHNSON SYNDROME: REPORT OF TWO CASES. (Spa.) Andres, A. G.; Megias, A. P.; Maillo, G. A.; Moya, J. E. (Residencia Sanitaria de la S. S. "20 de Noviembre," Alicante, Spain). *Rev. Esp. Enferm. Apar. Dig.* 46(5):553-558; 1975.

2861 CLINICAL CONSIDERATIONS ON A CASE OF DUBIN-JOHNSON SYNDROME (NONHEMOLYTIC CONSTITUTIONAL JAUNDICE). (Ita.) Tarantino, A.; Soleti, F. (Ospedale generale Provinciale, Tivoli, Italy). *Prog. Med. (Roma)* 30(24):1029-1035; 1974.

2862 DRUG METABOLISM IN GILBERT'S DISEASE. PART 1: STUDY OF THE PLASMA HALF-LIFE IN SUBJECTS WITH GILBERT'S DISEASE. (Ita.) Ponz de Leon, M.; Carulli, N. (Istituto Clinica Medica Generale, Universita Modena, Modena, Italy). *Fegato* 20(1):5-11; 1974.

2863 DRUG METABOLISM IN GILBERT'S DISEASE. PART 3: STUDY OF THE PLASMA HALF-LIFE OF TOLBUTAMIDE IN SUBJECTS WITH POSTHEPATIC AND HEMOLYTIC HYPERBILIRUBINEMIA. (Ita.) Ponz de Leon, M.; Carulli, N. (Istituto Clinica Medica Generale, Universita Modena, Modena, Italy). *Fegato* 20(1):17-23; 1974.

See also, 2844.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

2864 CHLORPROPAMIDE-INDUCED GRANULOMAS: A PROBABLE HYPERSENSITIVITY REACTION IN LIVER AND BONE MARROW. (Eng.) Rigberg, L. A.; Robinson, M. J.; Espiritu, C. R. (Mt. Sinai Medical Center, 4300 Alton Rd., Miami Beach, FL 33140). *JAMA* 235(4):409-410; 1976.

The case report of a diabetic patient who developed anicteric hepatitis, associated with fever and exfoliative dermatitis, 2 weeks after intake of a long-acting sulfonylurea, chlorpropamide (Diabinese) is presented. Granulomas showing heavy infiltration with eosinophils were found in the liver and bone marrow. These were interpreted as manifestations of an allergic reaction. The clinical signs, abnormal laboratory findings, and hepatic lesions subsided spontaneously on withdrawal of the drug; however, bone marrow changes persisted 7 months after cessation of the drug. This is thought to be the first report of a patient with liver and bone marrow inflammation characterized by granulomas with eosinophilic infiltration following intake of chlorpropamide.

2865 DIPHENYLHYDANTOIN-INDUCED HEPATIC NECROSIS: A CASE STUDY. (Eng.) Lee, T. J.; Carney, C. N.; Lapis, J. L.; Higgins, T.; Fallon, H. J. (Univ. North Carolina Sch. Medicine, Chapel Hill, NC 27514). *Gastroenterology* 70(3):422-424; 1976.

The case of a 21-yr-old woman with diphenylhydantoin (DPH)-induced hepatic necrosis is presented and is compared with similar case studies. The patient received DPH and phenobarbital treatment for post-traumatic seizure for 18 months before presentation with malaise and progressive weakness. One week after hospitalization, during which time the patient was receiving 100 mg of DPH (3 times/day) and 100 mg phenobarbital (3 times/day), she developed lymphadenopathy, fever, exfoliative dermatitis, and hepatic failure. The patient died in hepatic coma, and autopsy disclosed massive hepatic necrosis. It is concluded that studies of liver function are indicated in patients who receive DPH to assess the true incidence of hepatocellular injury.

2866 HALOTHANE-INDUCED LIVER DAMAGE: AN ANALYSIS OF THE MATERIAL REPORTED TO THE SWEDISH ADVERSE DRUG REACTION COMMITTEE, 1966-1973. (Eng.) Bottiger, L. E.; Dalen, E.; Hallen, B. (Karolinska Hosp., S-104 01 Stockholm, Sweden). *Acta Anaesthesiol. Scand.* 20(1):40-46; 1976.

An analysis was made of 94 patients who developed liver injury following surgery and halothane anesthesia over an 8-yr period. Thirteen of the 94 patients died. Seventy-five percent of all patients and 12 of the 13 fatal cases experienced at least one halothane exposure previous to the one under analysis. Of the 83 patients for whom such information was available, only 15 were anesthesized for more than 2 hr. The interval between halothane anesthesia and the appearance of fever was almost 7 days after a single exposure, but was reduced to 4 days after multiple exposures. Corresponding figures for the appearance of jaundice were 8 and 7 days, resp. Halothane hepatitis was more common in older patients. The results indicate that halothane administration causes a drug-induced type of hepatitis, an allergic manifestation, representing acquired hypersensitivity. The type and duration of the surgical intervention in these cases was uncharacteristic and did not include a large number of upper abdominal operations, which are known to carry an increased risk of hepatic damage. No patient had prolonged hypotension. The number receiving blood transfusions was small, and the interval between transfusion and the onset of hepatic disease, in all instances, was too short to seriously consider serum hepatitis. It is not suggested that the use of halothane be withheld, but rather that the drug should not be used indiscriminately as liver injury becomes more severe following repeated exposures.

2867 SERUM FERRITIN LEVELS IN ACUTE HEPATOCELLULAR DAMAGE FROM PARACETAMOL OVERDOSAGE. (Eng.) Eastham, E. J.; Bell, J. I.; Douglas, A. P. (Royal Victoria Infirmary, Newcastle upon Tyne NE1 4LP, U.K.). *Br. Med. J.* 1(6012):750-751; 1976.

Serum ferritin levels were measured in 25 patients who had taken an overdose of paracetamol within the preceding 18 hr, and the correlation between these levels, transaminase, and degree of hepatocellular damage (as determined by biopsy) was examined. Eight patients with mild and one patient with moderate liver damage had normal levels of serum aspartate aminotransferase (SGOT, 4-20 IU); eight of these patients attained serum ferritin levels that were significantly increased from the initial value by the third day of hospitalization. Seven patients with moderate and one with mild liver damage had increased SGOT (<400 IU), and ferritin levels were elevated by the third day in six patients. The eight remaining patients had severe liver damage, SGOT levels higher than 400 IU, and greatly increased ferritin (1,070->6,000 μg/l) by the third day. There was no overall correlation between ferritin and transaminase levels on the third day, but when the ferritin changes were expressed as a percentage of the initial values, a definite correlation emerged ($p<0.05$). Serum ferritin levels, in acute hepatocellular damage, correlate closely with pathological changes and are more sensitive than transaminase estimations.

2868 PIPERAZINE HEPATITIS. (Eng.) Hamlyn, A. N.; Morris, J. S.; Sarkany, I.; Sherlock, S. (Royal Free Hosp., Pond St., London NW3, England). *Gastroenterology* 70(6):1144-1147; 1976.

The first reported case of a 25-yr-old woman who on two occasions developed an acute hepatitis reaction after piperazine administration is presented. Piperazine phosphate was prescribed for this patient for the treatment of threadworms. Malaise and vomiting developed 3 weeks later and jaundice occurred at the end of the 4th week. The patient was treated with i.v. dextrose, vitamin K, dietary protein restriction, and oral neomycin, resulting in the diappearance of confusion and a rise in Thrombotest. Prednisone (20 mg/day) was administered when the cholestasis persisted. After 2 weeks, serum bilirubin fell from 24 to 5 mg/dl. The patient was discharged with a presumptive diagnosis of resolving viral hepatitis. One year later, she was again given piperazine phosphate (4 g) for threadworm infestation, and again she experienced an acute reaction. Liver biopsy performed during each reaction showed changes of acute hepatitis that were more severe on the second occasion. The evidence favors a hypersensitivity mechanism rather than a direct toxic effect of piperazine or its metabolites on the liver. The humoral or cellular immune basis for such hypersensitivity has not yet been elucidated.

2869 QUINIDINE HYPERSENSITIVITY AND LIVER INVOLVEMENT: A SURVEY OF 32 PATIENTS. (Eng.)

Geltner, D.; Chajek, T.; Rubinger, D.; Levij, I. S. (Hadassah Univ. Hosp., P.O. Box 499, Jerusalem, Israel). *Gastroenterology* 70(5):650-652; 1976.

The case histories of 487 patients who received quinidine therapy were analyzed to determine the frequency of quinidine-induced liver disease. Thirty-two patients developed hypersensitivity reactions, and 10 of these patients had clinical and biochemical manifestations of liver involvement. All patients suffered from arteriosclerotic heart disease and received quinidine because of ventricular supraventricular arrhythmias. In 8 out of 10 patients, the symptomatology developed within 2 weeks of commencing quinidine treatment and in the other 2 cases, symptoms appeared only after 90 days and 180 days, resp. In four patients, liver biopsy showed granulomatous hepatitis. Clinical signs included fever (9), hepatomegaly (4), splenomegaly and lymphadenopathy (1), skin rash (2), and pruritus (1). Liver involvement was confirmed by liver function tests. Discontinuation of the drug resulted in disappearance of symptoms. The results suggest that quinidine-induced hepatitis is a relatively common side effect of this drug.

2870 QUINIDINE HEPATOTOXICITY. A REPORT OF A CASE AND REVIEW OF THE LITERATURE. (Eng.)

Koch, M. J.; Seeff, L. B.; Crumley, C. E.; Rabin, L.; Burns, W. A. (Veterans Admin. Hosp., 50 Irving St., N.W., Washington, DC 20422). *Gastroenterology* 70(6):1136-1140; 1976.

A case of presumed quinidine hepatotoxicity in a 47-yr-old man is presented. The patient was hospitalized complaining of palpitations, light-headedness, and a recent history of increased shortness of breath, dyspnea on exertion, and orthopnea. On the third day of hospitalization, quinidine sulfate (200 mg, p.o.) was given every 6 hr. After the third dose, it was stopped due to onset of diarrhea, but it was reinstituted on the sixth day. Ten days after the initial dose of quinidine, the patient developed chills, nausea, vomiting, and vague upper abdominal pain. On the 14th day, SGOT and SGPT levels were abnormal for the first time, and alkaline phosphatase was 210 mU/ml. On day 31, a percutaneous liver biopsy and electron microscopic studies revealed changes that were suggestive of drug-induced hepatitis. On day 35, all medications except digoxin were discontinued. SGPT peaked at 910 mU/ml and alkaline phosphatase at 210 mU/ml on day 36, then both declined rapidly as did the fever. Two months after discharge, the patient was challenged with quinidine sulfate (200 gm, p.o., 6 hr, 4 doses). At 32 hr after the last dose, he complained of discomfort, his temperature rose, as did the SGPT and SGOT levels. Transaminase values returned to normal at 103 hr after the last dose of quinidine. It is suggested that the development of unexplained fever within 1 month of quinidine administration should alert the physician to the possibility of a hepatotoxic reaction and should signal the need for appropriate evaluation.

2871 HISTOPATHOLOGY OF LIVER LESIONS ASSOCIATED WITH EXPOSURE TO VINYL CHLORIDE MONOMER.

(Eng.) Weinbren, K. (Royal Postgraduate Medical Sch., Du Cane Road, London, W12 OHS England). *Proc. R. Soc. Med.* 60(4):299-303; 1976.

Changes that occur in the liver of patients suffering from angiosarcoma and of patients who were exposed to vinyl chloride monomer but did not show evidence of tumor development are described. In general, tumors showed dark hemorrhagic nodules, cariable distortion and fibrosis of liver tissue, and necrosis. Three types of angiosarcoma were characterized: the sinusoidal pattern in which dilated hepatic sinusoids are lined by enlarged and proliferating tumor cells, with hepatocyte plates clearly recognizable between tumor cells; the papillary type in which papillary formations of tumor cells are borne on a core of connective tissue, which include surviving hepatocytes; and the cavernous type in which marked dilation of sinusoids are surrounded by thick fibrous walls lined by tumor cells. Generally, the tumor cell was distinguishable from hepatocytes; it resembled cells normally associated with vessel walls and also appears to be closely related to vascular spaces with variable degrees of abnormality. There were marked changes in other elements (especially the supporting stroma) in both tumor-free and tumor-bearing parts of the liver. These alterations range from minor increases in reticulin fibers to massive increases in collagen fibers, which obstruct the lumen. Fibrosis of the portal tracts was also noted. The relevance of nontumorous changes to the subsequent development of angiosarcoma must be resolved since many of the alterations appear in other conditions such as congestive cardiac failure, lymphomas, and other drug toxicity situations.

2872 TRAUMATIC LESIONS OF THE LIVER: THERAPEUTIC ASPECTS. (Por.)

Mendes de Almeida, J. M.; Palla Garcia, J. (Hospital de Arroios, Servico no. 2, Lisbon, Portugal). *Bol. Clin. Hosp. Civis Lisboa* 35(1/4):115-141; 1973-1974.

2873 HEPATIC LESION IN THE COURSE OF TREATMENT WITH C.C.N.U. (Fre.)

de Labarthe, B. Chahinian, P.; Gosselin, M.; Goasguen, J.; Ferrand, B.; Danrigal, A.; Israel. L. (C.H.U. 35000 Rennes, France). *Sem. Hop. Ther.* 51(5/6):309-314; 1975.

2874 SERIOUS ACUTE EXPERIMENTAL HEPATOCELLULAR INSUFFICIENCY WITH COMA: ACTION OF DIMETHYLNITROSAMINE IN DOGS. (Fre.) Testas, P.; Benichou, J.; Benhamou, M.; Trivin, F.; Vieillefond, A.; Ghika, I.; Jan, D.; Ollier, A. (Hopital Paul-Brousse, 94800 Villejuif, France). *Med. Chir. Dig.* (Suppl. 2):21-23; 1975.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

2875 A RADIOIMMUNOASSAY TO DETERMINE THE SUBTYPES D AND Y OF THE HEPATITIS-B SURFACE ANTIGEN. (Eng.) Thamer, G.; Kommerell, B. (Gastroenterologische Abteilung der Medizinischen Klinik, 69 Heidelberg, Bergheimer Str. 58, West Germany). *J. Lab. Clin. Med.* 87(4):734-738; 1976.

A sensitive radioimmunologic test system for determining the subtypes D and Y of the hepatitis B surface antigen (HBsAg, Australia antigen, HAA) is described. The technique uses the immunoadsorption principle; the antigen to be subtyped is incubated with an antiserum containing ^{125}I-labeled antibodies to the antigenic determinants a, d, and y. The specificity of the antibody, which is not consumed in forming the antigen antibody complex, is determined by absorption on agarose. The HBsAg-containing serum to be subtyped is incubated in duplicate with antiserum for 24 hr at 24 C. Sepharose-HBsAg subtype D (Seph.-ad) and Sepharose-HBsAg subtype Y (Seph.-ay) are each added to one incubation, and are reincubated for 24 hr at 24 C. The incubates are subsequently transferred quantitatively into small columns, and the Sepharose-HBsAg complex is washed at pH 7.4. The activity bound to the Sepharose-HBsAg complexes in the columns is determined in the gamma counter. The quotient of the activities bound to the Sepharose-HBsAg complexes (c.p.m.-Seph.-ad/c.p.m.-Seph.-ay) was significantly lower ($p<0.005$) in determining the subtype D (1.01) than in determining the subtype Y (2.73). Thus, radioimmunoassay permits an unequivocal identification of HBsAg containing sera that had previously been subtyped. by conventional methods.

2876 BIOPHYSICAL AND BIOCHEMICAL PROPERTIES OF CR326 HUMAN HEPATITIS A VIRUS. (Eng.) Provost, P. J.; Wolanski, B. S.; Miller, W. J.; Ittensohn, O. L.; McAleer, W. J.; Hilleman, M. R. (Merck Inst. Therapeutic Res., West Point, PA 19486). *Am. J. Med. Sci.* 270(1):87-92; 1975.

A summary of the morphologic, physical, and chemical characteristics of CR326 human hepatitis A virus is presented. Electron microscopic examination of CR326 virus, purified by isopycnic banding from infected marmoset sera, revealed 27-mμ spherical particles. The particles were identified as hepatitis A virus by tests for infectivity and by specific neutralization of infectivity with convalescent human hepatitis A serum. Also, identical 27-mμ viruses in liver extracts gave specific reactions with hepatitis A antisera when tested by immune electron microscopy. The buoyant density of the virus in CsCl was 1.34 and it was heat (60 C), ether, and acid stable but it was destroyed by heat (100 C), formalin (1:4000), and UV irradiation. Electron microscopic studies of sections of infected marmoset liver showed intracytoplasmic virus particles, usually in vesicles. Presumptive findings for RNA, together with the intracytoplasmic location of the virus, indicated the virus to be of RNA-type. The characteristics of the virus indicate that it is closely related to the enterovirus family and not to hepatitis B virus.

2877 ANTIBODIES AGAINST HEPATITIS B (SURFACE) ANTIGEN IN PATIENTS WITH HEPATITIS AND OTHER GROUPS OF EPIDEMIOLOGIC INTEREST. (Ger.) Lange, W.; Apodaca, J.; Kohler, H. (Robert-Koch-Institut Berlin, D-1 Berlin 65, Nordufer 20, West Germany). *Zentralbl. Bakteriol. (Orig.A)* 232(2/3): 199-212; 1975.

Sera of patients with hepatitis A and B and of patients in a hemodialysis unit as well as sera of drug addicts were examined for the presence of antibodies against hepatitis B surface antigen (HBsAg) using the Ausab test, a new radioimmunoassay. In 79.3% of the hepatitis B patients, the occurrence of antibodies against HBsAg (anti-HBsAg) was noted after the HBsAg had disappeared. In hepatitis A patients, anti-HBsAg was detected in 15.5% of the adults and in 4.6% of the children. These antibodies persisted over an observation period of up to 15 months and were not connected with the apparent illness at the time of the examination. These results are an indication of the frequency of antibodies against HBsAg in the normal population. In two patients with hepatitis A, a delayed antibody reaction similar to that seen in hepatitis B patients was observed, though HBsAg was not detected (Ausria 125 test). It is assumed that these patients suffered from hepatitis B, which was diagnosed as hepatitis A on the basis of the negative HBsAg status. According to this observation, not all cases of HBsAg-negative hepatitis are necessarily type A, but are occasionally type B, which is not detectable by means of HBsAg assay at the time. Drug addicts without hepatitis at the time of investigation showed 50.8% anti-HBsAg; in 24.3%, HBsAg was detected by means of the Ausria 125 test. In 19 drug addicts with positive antigen or antibody status, a history of hepatitis was established. Patients in the hemodialysis unit were HBsAg carriers in 9.2% of cases, and 53.5% were anti-HBsAg carriers. The data obtained from drug addicts and dialysis patients point to a high risk of infection in both groups and to a frequent contact with HBsAg (booster) in dialysis units. The combined application of sensitive tests for the detection of antigen and antibodies (radioimmunoassays) with regard to epidemiological and anamnestic studies is recommended.

2878 STUDY OF THE EFFECT OF REST IN THE EVOLUTION OF VIRAL HEPATITIS.

(Fre.) Laverdant, C.; Cristau, P.; Essioux, H.; Molinie, C.; Gendron, Y.; Bernard, J.; Kassem, A. (Hopital Militaire Begin, 94160 Saint-Mande, France). *Sem. Hop. Paris* 51(15):1001-1007; 1975.

The therapeutic value of bed rest and restricted physical activity was studied in 214 servicemen with viral hepatitis who were hospitalized on days 1-4 after the appearance of jaundice. Of the group, 104 were returned to home base on days 11-13 with no restrictions. The remaining 110 were kept on bed rest except for meals and elimination until their urinary transaminase levels fell below 100 IU. Outdoor walks were permitted after approximately 29 days. Recovery was complete in all but 10 subjects on bed rest, while 23 of the group on full activity experienced relapse or persistence of disease. A retrospective study of another group of 51 subjects who experienced relapses on days 9-22 of hepatitis revealed that 24 had remained active during that period. A third study of 154 patients concluded that physical and intellectual activity or excessive eating and drinking do not have a negative effect on the course of viral hepatitis on days 30-60. It is concluded that physical activity be restricted until transaminase activity is normal (on about day 30). During this period resumption of work should definitely be prohibited.

2879 VIRAL HEPATITIS: RECENT DEVELOPMENTS AND PROSPECTS FOR PREVENTION.

(Eng.) Krugman, S. (550 First Ave., New York, NY 10016). *J. Pediatr.* 87(6):1067-1077; 1975.

Research on the etiologic, epidemiologic, immunologic, and prophylactic aspects of type A and type B hepatitis virus infection is reviewed. The hepatitis A virus was found to be a 27 nm particle with characteristics resembling an enterovirus. Hepatitis A infection was transmitted to marmosets and chimpanzees. In addition, specific complement fixation and immune adherence antibody tests for hepatitis A were developed. Recent advances in hepatitis B research include: (1) identification of the virus as a 42 nm particle (Dane particle) containing an outer coat, the hepatitis B surface antigen, and an inner core, the hepatitis B core antigen; (2) development of specific tests to detect the hepatitis B antigens and their respective antibodies; (3) transmission of the infection to chimpanzees; (4) development of a specific hepatitis B immune serum globulin; and (5) development of an inactivated hepatitis B vaccine.

2880 AN OUTBREAK OF TYPE B HEPATITIS ASSOCIATED WITH TRANSFUSION OF PLASMA PROTEIN FRACTION.

(Eng.) Pattison, C. P.; Klein, C. A.; Leger, R. T.; Maynard, J. E.; Berquist, K. R.; Hofnagle, J. H.; Barker, L. F.; Bryan, J. A.; Smith, D. E. (Center Disease Control, 4402 North 7th St., Phoenix, AZ 85014). *Am. J. Epidemiol.* 103(4):399-407; 1976.

An outbreak of type B hepatitis, at a 1200 bed hospital, following transfusion with a single lot (B) of plasma protein fraction (PPF) is described. Of 51 PPF recipients, 31 participated in the study and 19 (61%) had an illness compatible with hepatitis. Patients who had transfusions on the cardiovascular surgery service (CVS) were studied to examine the association between lot B and post transfusion hepatitis. This group included 19 of the 31 members of the study population, as well as a matched control group. None of the control patients developed clinical hepatitis as compared with 11 patients (58%) in the CVS study group who received lot B ($p<0.001$). Serological data from blood samples from 29 of the 31 members of the lot B study group showed evidence of prior infection with hepatitis B virus in 90% of the cases. These findings provided evidence that lot B was the vehicle for transmission of disease. Recipients of four other PPF lots from the same manufacturer were studied. Two of these lots were also associated with extremely high clinical hepatitis rates (45% and 55%). The other two lots, which were prepared from donor plasma, contributing to the composition of the initially studied PPF lot, failed to produce clinical illness, although one of these lots was associated with a high prevalence of hepatitis B seropositivity. It is suggested that heat treated PPF was involved in the transmission of type B hepatitis. Additional studies are required to determine the effects of pasteurization on inactivating hepatitis B virus.

2881 RECENT ADVANCES IN VIRAL HEPATITIS: PART I.

(Eng.) Melnick, J. L.; Hollinger, F. B.; Dreesman, G. R. (Baylor Coll. Medicine, Houston, TX 77030). *South. Med. J.* 69(4):468-475; 1976.

Recent advances in the understanding and clinical aspects of viral hepatitis are reviewed. The epidemiologic and clinical features of types A and B human hepatitis virus infections are compared, and the physicochemical properties of the two viruses are summarized. Either A or B virus infection can result in the most common histopathologic lesion, classical viral hepatitis. Subacute hepatic necrosis occurs in 5-15% of the cases, and it is more severe. Acute fulminant hepatitis is rare with type A (<0.1%), and it is uncommon in type B infections (1-3%). Cholestasis or chronic persistent hepatitis may complicate acute hepatitis, and chronic aggressive hepatitis occurs in 3-10% of cases of type B viral infection. Complete recovery occurs in most patients with type A and in 85% of those with type B. The persistence of hepatitis B antigen in the blood of a recovered patient represents a continual potential source of infection. Laboratory features and tests for infection are summarized, and the various means of demonstrating hepatitis B antigen are discussed. A single infection with virus of either type confers homologous but not heterologous protection against reinfection. The possible association between hepatitis and hepatoma, periarteritis nodosa, and chronic active hepatitis is noted.

2882 NORMAL DISPOSITION OF OXAZEPAM IN ACUTE VIRAL HEPATITIS AND CIRRHOSIS. (Eng.)

Shull, H. J., Jr.; Wilkinson, G. R.; Johnson, R.; Schenker, S. (Vanderbilt Univ. Sch. Medicine, Nashville, TN). *Ann. Intern. Med.* 84(4):420-425; 1976.

The effect of acute and chronic hepatic parenchymal disease on the elimination of oxazepam was investigated in seven patients with acute viral hepatitis, six patients with cirrhosis (men aged 37-57), and in age-matched control subjects (aged 14-84). All subjects received 45 mg oxazepam p.o. Unchanged oxazepam appeared rapidly in the plasma, reaching a maximum level after 2-4 hr. The peak concentration of total oxazepam, achieved at the same time or slightly later, was approximately 150-250% greater than the unchanged drug, and its concentration also decreased exponentially with a similar half-life to that of the total drug. These values are comparable to values obtained in age-matched controls ($p>0.05$). The older control group had a statistically larger apparent volume of distribution as assessed by Vd(β) ($p<0.02$) than the younger group, but such a difference was not apparent when the distribution space was estimated as Vd(extrap). The apparent distribution volume of oxazepam, its plasma binding, blood/plasma ratio, and rate of urinary excretion, predominantly as the glucuronide, were comparable ($p>0.05$) in the two groups of patients with liver disease and their respective controls. Unlike many other sedatives, oxazepam is eliminated normally in patients with parenchymal liver disease and, therefore, on pharmacokinetic grounds, it seems to be an excellent sedative for use in such persons.

2883 VIRAL HEPATITIS: A PATHOLOGIC SPECTRUM.

(Eng.) Peters, R. L. (Univ. Southern California Sch. Medicine, Los Angeles, CA 90007). *Am. J. Med. Sci.* 270(1):17-31; 1975.

Pathologic changes that provide difficulty in the application of the liver biopsy as a prognostic as well as diagnostic tool are discussed in relation to viral hepatitis. Three major classes of morphologic change associated with this disease are acute cytological damage, inflammatory reaction, and hepatocellular regeneration. Acute viral hepatitis shows a generalized but centrolobularly accentuated acute cell damage including poorly defined areas of hepatocytolysis occurring nearly simultaneously with a hyperplastic and exudative inflammatory reaction. Regeneration is recognizable by the time that symptoms appear. Variations in histologic patterns of acute viral hepatitis often result in an overdiagnosis of chronic liver disease. The most confusing morphologic characteristics are: unusual extent of necrosis, excessive inflammatory response, and increased amounts of collagen. Histologic changes in liver tissue of patients who have recovered from fulminant viral hepatitis illustrate the extreme examples of excessive necrosis from viral hepatitis that might be seen on liver biopsy. These cases do not progress characteristically to chronic hepatitis or cirrhosis. Diagnostic difficulties may occur in patients with altered immune responses or pre-existing liver disease. Except for older patients, those with severe necrotic changes during acute hepatitis do not usually develop severe sequelae of disease. Chronic active hepatitis is progressive and is characterized pathologically by changes in the distribution of necrosis and regeneration within the lobule. "Cobblestone" hepatocellular change resembling continuing regeneration, focal hepatocytolysis, and, frequently, portal lymphoid hyperplasia characterize persistent viral hepatitis. These features fade with time, and in type B persistent viral hepatitis, the incidence of "ground glass" cells with hepatitis B surface antigen increases. It is suggested that this may reflect a continued adaptation of host and virus to one another.

2884 HEPATITIS B ANTIGEN AND ANTIBODY IN THE U.S. ARMY: PREVALENCE IN HEALTH CARE PERSONNEL.

(Eng.) Segal, H. E.; Llewellyn, C. H.; Irwin, G.; Bancroft, W. H.; Boe, G. P.; Balaban, D. J. (Walter Reed Inst. Res., Washington, DC 20012). *Am. J. Public Health* 66(7):667-671; 1976.

A cohort of 5,443 military health care personnel was studied to determine the prevalence of hepatitis B antigen (HBsAg) and antibody (anti-HBs). Sera were tested for HBsAg by radioimmunoassay, and sera HBsAg-positive by counter-electrophoresis were subtyped. Antibody was determined by a passive hemagglutination test. Serologic evidence of hepatitis B infection (HBsAg or anti-HBs) was found in 270 personnel. Of 30 HBsAg-positive sera, 12 were subtypable; 10 were HBsAg/adw and 2 were HBsAg/ayw. In the 1,534 physicians, 849 dentists, and 1,370 nurses (all directly involved in patient care), there was a 5.8% rate of seropositivity, whereas in personnel who were involved in non-patient care, there was a 2.8% rate. Two hundred and three personnel reported a history of hepatitis, and 183 reported receiving a blood transfusion. A greater proportion of personnel with one or more months in surgical specialties were hepatitis B virus-positive than were those with one or more months in medical specialties (11.1% versus 8.1%). Of 1,255 personnel born in urban areas, 10 were HBsAg-positive, 60 were anti-HBs-positive, and 70 were hepatitis B virus-positive. Of 1,489 personnel from rural areas, the corresponding figures were 6, 56, and 62, resp., and for 85 personnel born in foreign countries, they were 3, 5, and 8, resp. Of personnel with previous overseas assignments, primarily non-patient case oriented officers who served in Southeast Asia, 9.6%

had serologic evidence of hepatitis B infection; 4.5% of personnel without prior overseas service had such evidence. These data present a composite of risk factors that are operative in the acquisition of hepatitis B seropositivity.

2885 HEPATITIS A AND B IN THE FAMILY UNIT: NONPARENTERAL TRANSMISSION BY ASYMPTOMATIC CHILDREN. (Eng.) Vernon, T. M.; Wright, R. A.; Kohler, P. F.; Merrill, D. A. (Colorado Dept. Health, 4210 E. 11th Ave., Denver, CO 80220). *JAMA* 235(26): 2829-2831; 1976.

An outbreak of hepatitis A in 12 members of 6 families in an organization for the adoption of Vietnamese children was investigated. Thirty-two of the organization's 37 families were studied. Only three of the hepatitis patients had contact with another hepatitis patient prior to the onset of illness. Ten of the 12 cases occurred among 40 family members who had close contact with the adopted children. Eighty-five members had either close or casual contact; all 12 cases occurred among these 85, while none occurred among 74 family members without contact ($p<0.01$). During and after the outbreak, 33 Vietnamese adoptees and 59 Americans (33 adults and 26 children) in 26 adopting families were tested for hepatitis B surface antigen (HBsAg) by electroimmunodiffusion and solid-phase radioimmunoassay and for anti-HBs by the passive hemagglutination technique employing HBsAg-coated RBC. Nine of the 33 Vietnamese were positive for HBsAg and 10 were positive for anti-HBs. None of the Americans was positive for HBsAg. Two of 33 adults were positive for anti-HBs, and 6 of the 26 American children were positive. The eight Americans with positive reactions for anti-HBs represented six families, all of whom had adopted a Vietnamese child. Five of the six antibody-positive American children had an HBsAg-positive Vietnamese child in their families at the time of serologic testing. It is concluded that hepatitis A was probably introduced into adopting families by the asymptomatic children. Thus, healthy orphans from high hepatitis incidence areas may transmit hepatitis B, as well aa hepatitis A, in the family unit.

2886 HB-ANTIGEN IN SERUM AND SYNOVITIS IN ACUTE HEPATITIS WITH AND WITHOUT POLYARTHRITIS. (Eng.) Baenkler, H. W.; Topf, G. (Institut und Poliklinik fur Klinische Immunologie der Universitat Erlangen-Nurnberg, D-8520 Erlangen, Krankenhausstr. 12, W. Germany). *Klin. Wochenschr.* 53(19): 927-928; 1975.

Serum and synovial-fluid of 27 patients with acute hepatitis were tested for the presence of hepatitis B antigen (HBAg). It was detected in the serum in 19 cases, in the synovial-fluid in 2 cases, but never in both serum and synovial-fluid. HBAg was not found in six patients. Polyarthritis was seen in 10 cases; 5 of them carried HBAg in the serum, and 2 carried it in the synovial-fluid. A hepatitis B, however, was also suspected in the three cases with polyarthritis lacking HBAg. The results suggest that virus B may also persist in joints and that polyarthritis associated with acute hepatitis is coupled to an infection with virus B.

2887 MEMBRANOUS GLOMERULONEPHRITIS ASSOCIATED WITH ACTIVE LIVER CIRRHOSIS BOTH INVOLVED BY HBs ANTIGEN. (Eng.) Moriyama, M.; Fukuda, Y.; Ishizaki, M.; Sugisaki, Y.; Masugi, Y. (Nippon Medical Sch., 1-1-5 Sendagi, Bunkyo-ku, Tokyo, Japan 113). *Acta Pathol. Jpn.* 26(2):237-250; 1976.

The case report of a 35-yr-old woman with a relatively short clinical course of severe liver cirrhosis and proteinuria is described. An autopsy revealed membranous glomerulonephritis associated with active liver cirrhosis. The liver demonstrated postnecrotic cirrhosis, having active hepatic signs with spotted acidophilic bodies in pseudolobuli with fatty change of hepatocytes, and prominent Kupffer cell mobilization in sinusoids. The kidneys showed typical membranous glomerulonephritis with diffuse thickening of glomerular basement membrane (GBM) and minimal cellular proliferation, having no distinct damage of vas afferens. Immunofluorescent study disclosed not only clustered hepatitis B surface antigen (HBsAg) in occasional hepatic cells, but also beaded granular type deposition of HBsAg, immunoglobulin (Ig) G, IgM, IgA, and complement C_3 along the renal GBM. Electron microscopy disclosed multiple particulate material in occasional bodies of hepatic cells and in subepithelial and subendothelial dense deposits along the GBM. The particles measured 200-400 A in diameter and were compatible with HBsAg. The majority of the particles were larger and were identified as Dane particles. Enzymatic immunoelectron microscopy confirmed that these particles, especially along the GBM, were HBsAg. It is concluded that the HBsAg-antibody complex is the pathogenetic factor that is responsible for the glomerular change of this particular case.

2888 HEPATITIS B SURFACE ANTIGEN AND ANTIBODY: A PROSPECTIVE STUDY IN ASYMPTOMATIC DRUG ABUSERS. (Eng.) Stimmel, B.; Vernace, S.; Schaffner, F. (Mt. Sinai Sch. Medicine, 100th St. and Fifth Ave., New York, NY 10029). *JAMA* 234(11):1135-1138; 1975.

The course of reactivity of hepatitis B surface antigen (HBsAg) and antibody (anti-HBs) in 238 asymptomatic heroin addicts entering methadone maintenance was followed up for periods of 1-4 yr. Sera were analyzed for HBsAg by solid-phase, double-antibody radioimmunoassay; anti-HBs was determined by passive hemagglutination. On initial determination, HBsAg was seen in 39.1%, anti-HBs in 10.5%, and HBsAg and anti-HBs in 9.2%; only 41.2% of persons tested had no detectable titers of either antigen or antibody. Abnormal liver function (i.e., SGOT levels >50 mIU, SGPT >50 mIU, alkaline phosphatase >85 mIU, and bilirubin >1.2 mg/100 ml) was found initially in 83%; there was no significant difference between those with or without HBsAg and anti-HBs. At the conclusion of each study year, 50-

60% of persons initially HBsAg-positive reverted to negative, and HBsAg was absent in all persons followed up through the fourth year of treatment. Anti-HBs persisted in two-thirds of the patients during the entire study. These results suggest that in addicts, the HBsAg carrier state is not maintained if exposure is eliminated.

2889 SERUM HEPATITIS IN THE LIGHT OF RECENT RESEARCH. (Rus.) Tareev, E. M. (No affiliation given). *Sov. Med.* (5):27-37; 1975.

2890 ANTIGENIC SUBGROUPS OF HEPATITIS B (SURFACE) ANTIGEN IN BERLIN (WEST) AND THEIR EPIDEMIOLOGICAL ASPECTS. (Eng.) Lange, W.; Overby, L. R.; Werner, J.; Kohler, H.; Apodaca, J. (Robert Koch-Institut. Abt. fur Virologie, D-1 Berlin 65, Nordufer 20, Germany). *Zentralbl. Bakteriol.* [*Orig A*] 233(1):1-7; 1975.

2891 USE OF ENZYME SPECTRUM OF THE BLOOD SERUM IN DIFFERENTIAL DIAGNOSIS OF VIRAL HEPATITIS IN CHILDREN. (Rus.) Gol'zand, I. V.; Popova, L. A.; Zhukeva, E. A.; Kolygin, B. A.; Petrova, E. M.; Lipatova, L. V.; Danilova, V. A. (Leningrad Scientific Res. Inst. Infectious Diseases in Children, Leningrad, USSR). *Pediatriia* (6):38-42; 1975.

2892 DIFFERENTIAL DIAGNOSTIC SIGNIFICANCE OF HAPTOGLOBIN IN VIRAL HEPATITIS AND SUBHEPATIC JAUNDICE. (Rus.) Anisimova, V. A.; Osadchuk, M. A. (Dept. Infectious Diseases, Kuibyshev Medical Inst., Kuibyshev, USSR). *Vrach. Delo* (6):140-142; 1975.

2893 HAPTOGLOBIN, CERULOPLASMIN AND TOTAL GLYCOPROTEIN LEVELS IN VIRAL HEPATITIS. (Bul.) Zozikov, V.; Zheliavkova, V.; Dimov, Ts.; Papazian, A. (Medical Acad., Varna, Bulgaria). *Suvrem. Med. (Sofia)* 26(7):28; 1975.

2894 LAPAROSCOPY IN HEPATITIS AND LIVER CIRRHOSIS. (Rus.) Zabarskii, L. T. (Railroad Hosp., Chimkent, Kazakh SSR, USSR). *Klin. Med.* 53(10):83-86; 1975.

2895 RABBIT POPLITEAL LYMPH NODE ROUTE USED FOR THE PREPARATION OF ANTI-SERUM AGAINST HEPATITIS B ANTIGEN. (Chi.) Tsai, N.-C.; Kuo, L.-H.; Hong, S.-W.; Chen, L.-D.; Wang, H.-P.; Li, Y.-Y.; Chao, S.-S.; Kuo, J.-S. (Hupeh Provincial Biological Res. Lab., China). *Kexue Tongbao* 19(9): 428-430; 1974.

2896 CHANGE IN THE TOTAL PROTEINS AND PROTEIN FRACTIONS IN THE SECRETION OF SALIVARY GLANDS IN PATIENTS WITH VIRAL HEPATITIS. (Rus.) Sagradian, A. L. (No affiliation given). *Soobshch. Akad. Nauk Gruz. SSR* 80(1):209; 1975.

2897 CHARACTERISTICS OF MASSIVE NECROSIS OF THE LIVER IN VIRAL HEPATITIS IN CHILDREN. (Rus.) Kupershein, A. P.; Pashkova, L. A. (Karaganda Hosp. Infectious Diseases, Karaganda, USSR). *Sov. Med.* (9):149-150; 1975.

2898 POLYNEURITIS AS A COMPLICATION OF SERUM HEPATITIS. (Rus.) Il'inskii, Iu. A.; Brodov, L. E.; Bergman, G. A. (Second Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (6):140-141; 1975.

See also, 2812, 2847, 2900, 2901, 2911, 2967.

LIVER AND BILIARY TRACT

Chronic Hepatitis

2899 CHRONIC HEPATITIS--A PERSPECTIVE ON CLASSIFICATION AND DETERMINANTS OF PROGNOSIS. (Eng.) Boyer, J. L. (Univ. Chicago, 950 E. 59th St., Box 400, IL 60637). *Gastroenterology* 70(6):1161-1171; 1976.

The etiology, histological type, prognosis based upon histology, and treatment of chronic persistent hepatitis (CPH) and chronic active hepatitis (CAP) are reviewed. Both CPH and CAH may follow infection with hepatitis B virus or they may be caused by drugs or unknown causes, including "autoimmunity." CPH, but no CAH, is also seen after infection with hepatitis A virus. The histological picture of liver biopsy material is usually characteristic and diagnostic for each type. In CPH, the overall architecture of the liver is normal. Portal triads are either normal or moderately enlarged and contain lymphocytic infiltration, and there may be mild hepatocyte necrosis. In CAH, there may or may not be evidence of cirrhosis. Three histologic types are identified in the absence of cirrhosis: periportal piecemeal necrosis and inflammation, which may or may not be precirrhotic; bridging hepatic necrosis, which is definitely precirrhotic; and a combination of periportal piecemeal necrosis with bridging hepatic necrosis, which is also definitely precirrhotic. CPH is nonagressive, and treatment consists of reassurance and periodic follow-up. For CAH with cirrhosis or precirrhotic histology, steroid treatment is indicated: prednisone, 40-60 mg/day for 1-2 weeks, tapering to 20 mg/day over 4-6 weeks, consistent with the control of symptoms and liver function without causing side effects; alternate drug therapy is then used when possible, or in combination with azathioprine. The role of steroid therapy in CAH with periportal piecemeal necrosis and inflammation is unclear.

2900 HEPATITIS B SURFACE ANTIGEN (HBsAg) IN THE LIVER OF PATIENTS WITH HEPATITIS: A COMPARISON WITH SEROLOGICAL DETECTION.

(Eng.) Ray, M. B.; Desmet, V. J.; Fevery, J.; De Groote, J.; Bradburne, A. F.; Desmyter, J. (Akademisch Ziekenhuis Sint Rafael, Univ. Leuven, B-3000 Leuven, Belgium). *J. Clin. Pathol.* 29(2):89-93; 1976.

The immunofluorescent detection of hepatitis B surface antigen (HBsAg) in the liver of biopsy-proven hepatitis was compared with results of radioimmunoassay in the serum. In addition, the HBsAg status was compared with the presence of various histological forms of hepatitis; in chronic hepatitis, an attempt was made to correlate the HBsAg status and the histological type of disease with sex, gammaglobulin, transaminase values, and the presence of auto-immune antibodies. Chronic hepatitis was diagnosed on liver biopsy of 76 patients; 52 had HBsAg. Of the 52 patients with HBsAg, 23% had HBsAg shown by immunofluorescence in the liver, while it could not be detected with radioimmunoassay in the serum; 77% had HBsAg detectable in liver and in serum, and none had HBsAg in serum only. HBsAg was detected more frequently in chronic aggressive hepatitis and active cirrhosis than in chronic persistent hepatitis and cirrhosis with little activity. No correlation was found in the different forms of chronic hepatitis between the HBsAg status and levels of transaminases, gammaglobulins, and auto-antibodies. Acute hepatitis was diagnosed on liver biopsy of 24 patients; 50% had HBsAg. Liver tissue positivity was very low in the fully developed stage compared to serum positivity. These findings are consistent with the hypothesis that HBsAg-positive cells are cleared at high efficiency in acute hepatitis by normal immunological mechanisms. In 146 patients with other liver ailments, both liver and serum were negative for HBsAg.

2901 DISTRIBUTION PATTERNS OF HEPATITIS B SURFACE ANTIGEN (HBsAg) IN THE LIVER OF HEPATITIS PATIENTS.

(Eng.) Ray, M. B.; Desmet, V. J.; Fevery, J.; De Groote, J.; Bradburne, A. F.; Desmyter, J. (Akademisch Ziekenhuis Sint Rafael, Univ. Leuven, B-3000 Leuven, Belgium). *J. Clin. Pathol.* 29(2):94-100; 1976.

One hundred liver biopsies from 100 hepatitis patients were examined for hepatitis B surface antigen (HBsAg) by the indirect immunofluorescent technique to determine different patterns of HBsAg localization and the role of this antigen in the different types of hepatitis. Of the 60 positive specimens, 52 were diagnosed as various types of chronic hepatitis, and 8 were acute hepatitis. Four main distribution patterns of HBsAg were obtained: full cytoplasmic fluorescence with diffuse lobular distribution, cytoplasmic fluorescence with spotty distribution, peripheral fluorescence in the cell membrane and/or cell peripheries, and focal cytoplasmic positivity. There was an inverse relation between the number of positive hepatocytes and the extent of liver cell necrosis. The distribution patterns of HBsAg were distinctive in each type of chronic hepatitis and in acute hepatitis. Homogeneous full cytoplasmic fluorescence, distributed diffusely in the whole liver lobule, was observed in chronic persistent hepatitis and in cirrhosis with little activity, whereas peripheral liver cell membrane and/or peripheral cytoplasmic fluorescence associated with cytoplasmic positivity in a smaller number of hepatocytes was a characteristic finding in chronic aggressive hepatitis, active cirrhosis, and acute hepatitis with possible transition to chronicity. Focal cytoplasmic fluorescence was observed in acute hepatitis and in a group of biopsies in chronic hepatitis in which HBsAg was detected in the liver but no antigen was detectable in the serum. The results indicate that the different patterns of HBsAg distribution in the liver biopsy are helpful for the histological diagnosis of different types of HBsAg-positive viral hepatitis and are consistent with the hypothesis of the role of specific immune response in the pathogenesis of type B viral hepatitis.

2902 LYMPHOCYTE CYTOTOXICITY TO ISOLATED HEPATOCYTES IN CHRONIC ACTIVE HEPATITIS. THE ROLE OF T- AND B-CELLS.

(Eng.) Eddleston, A. L. W. F. (Liver Unit, King's Coll. Hosp., London, S.E. 5, England). *Tijdschr. Gastroenterol.* 18(6): 359-366; 1975.

The lymphocyte cytotoxicity to isolated rabbit hepatocytes was investigated in 22 patients with chronic active hepatitis, and the role of T- and B-cells was determined. A microcytotoxicity assay of lymphocytes from 20 of the 22 patients showed a significant cytotoxic effect on the isolated hepatocytes, whereas this was only rarely observed in patients with other chronic liver diseases. The cytotoxicity was almost completely blocked by the addition of 0.5 μg human or rabbit liver specific lipoprotein but not by a similar material prepared from human kidney. This suggests that the cytotoxicity was due to an immunological reaction directed specifically at the hepatocyte surface lipoprotein and it implies that this same reaction may be the basis of the *in vivo* liver damage. T- and B-cell preparations were made from the peripheral blood of 14 patients with uncontrolled or untreated chronic active hepatitis and they were tested for their cytotoxic effect on isolated rabbit hepatocytes. In all cases, removal of T-cells enhanced the development of cytotoxicity. In contrast, when cells forming EAS rosettes were removed, leaving a lymphocyte population enriched in T-cells, the cytotoxic effect was considerably diminished; the results fell into the normal range, in all but one of the cases.

2903 ANTI-ACTIN SPECIFICITY OF HUMAN SMOOTH MUSCLE ANTIBODIES IN CHRONIC ACTIVE HEPATITIS. (Eng.) Lidman, K.; Biberfeld, G.; Fagraeus, A.; Norberg, R.; Torstensson, R.; Utter, G.; Carlsson, L.; Luca, J.; Lindberg, U. (Natl. Bacteriological Lab., 105 21 Stockholm, Sweden). *Clin. Exp. Immunol.* 24(2):266-272; 1976.

F-actin was isolated from rabbit skeletal muscle and the formation of F-actin-smooth muscle antibody (SMA) complexes in high titer, broad-reacting SMA-positive sera was investigated by indirect immunofluorescence. The SMA-positive sera (derived from 30 patients, all but 1 with chronic active hepatitis) had titers $\geq$ 100 when reacted with smooth muscle fibers of rat stomach, rat renal glomeruli, and with the membrane region of thyroid cells. The smooth muscle and other relevant cell staining were abolished after absorption of sera with actin, and were found to be homogeneous by sodium dodecyl sulfate gel-electrophoresis and by electron microscopy. The actin antibodies were purified by precipitation of sera with F-actin and elution of the precipitates at acid pH. The purified antibodies stained all tissues in the same way as the original sera. In double immunodiffusion tests, all 30 sera gave precipitation with actin. It is concluded that these broad-reacting smooth muscle antibodies are directed against actin. The finding of high-titered smooth muscle antibody is of diagnostic value and supports the clinical diagnosis of active chronic hepatitis. In addition, anti-actin antibodies eluted from human sera are a suitable tool for studying actin-containing cellular structures.

2904 CONSIDERATIONS ON THE CLASSIFICATION OF CHRONIC HEPATITIS. (Rus.) Malakhovskii, Iu. E.; Likhachev, A. A. (Kemerovo Oblast Clinical Hosp. No. 1, Kemerovo, USSR). *Sov. Med.* (5):92-96; 1975.

2905 NOMENCLATURE AND CLASSIFICATION OF CHRONIC HEPATITIS. (Rus.) Bliuger, A. F.; Krupnikova, E. Z. (Riga Medical Inst., Riga, USSR). *Sov. Med.* (5):86-92; 1975.

2906 BASIC DIRECTIONS FOR THE TREATMENT OF CHRONIC HEPATITIS. (Ita.) Meccoli, V.; Fanelli, V. (No affiliation given). *Clin. Ter.* 73(4):383-390; 1975.

2907 EFFECTIVENESS OF IMMUNODEPRESSANTS IN THE TREATMENT OF PATIENTS WITH CHRONIC HEPATITIS AND LIVER CIRRHOSIS. (Rus.) Vakulenko, E. F. (Kiev Oblast Clinical Hosp., Kiev, USSR). *Vrach. Delo* (9):55-56; 1975.

2908 ATTEMPTED IMMUNOTHERAPY IN CHIMPANZEE HEPATITIS B CARRIERS: INDUCTION OF DELAYED HYPERSENSITIVITY TO HBsAg AND APPEARANCE OF CHRONIC AGGRESSIVE HEPATITIS [Abstract]. (Eng.) Prince, A. M.; Trepo, C.; Reich, L. (New York Hosp., Cornell Medical Center, New York, NY). *J. Med. Primatol.* 4(6):384-385; 1975.

2909 CONTROLLED TRIAL OF D-PENICILLAMINE THERAPY IN CHRONIC ACTIVE HEPATITIS [Abstract]. (Eng.) Sterns, R. B.; Wilkinson, S. P.; Williams, R. (King's Coll. Hosp., London, SE5, England). *Gut* 17(5):390; 1976.

2910 LYMPHOCYTE MEDIATED CYTOTOXICITY FOR CHANG LIVER CELLS IN ACUTE AND CHRONIC LIVER DISEASE [Abstract]. (Eng.) Jacques, E.; De Villiers, D.; Thomas, H. C.; Sherlock, S. (Royal Free Hosp., London NW3 2QG, England). *Gut* 17(5):389; 1976.

2911 AUSTRALIA ANTIGEN: CLINICAL ASPECTS IN JAPAN. (Eng.) Oda, T.; Suzuki, H.; Mitamura, K. (First Dept. Internal Medicine, Univ. Tokyo, Hongo 7-chome, Bunkyo-ku, Tokyo, Japan). *Asian Med. J.* 19(2):27-41; 1976.

2912 AUSTRALIA ANTIGEN: FROM CLINICAL MEDICINE TO PATHOLOGY. (Eng.) Kosaka, K. (Okayama Univ. Medical Sch., Shikada-cho, Okayama 700, Japan). *Asian Med. J.* 19(2):42-59; 1976.

2913 INSULIN SECRETION IN PATIENTS WITH CHRONIC HEPATITIS TREATED WITH LIPOSTABIL. (Eng.) Kuska, J.; Kokot, F. (Silesian Medical Acad., Poland). *Pol. Med. Sci. Hist. Bull.* 15/3(4):433-438; 1975.

See also, 2805, 2812, 2840, 2847, 2878, 2883, 2887.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

2914 IRON DEPOSITS IN CHRONIC ALCOHOLICS. SPECIAL STUDIES IN RELATION TO THE IRON CONTAINED IN RED WINE. (Eng.) Miralles Garcia, J. M.; de Castro del Pozo, S. (Faculty Medicine, Univ. Salamanca, Spain). *Acta Hepatogastroenterol.* 23(1):10-19; 1976.

The iron deposits of 52 chronic alcoholics were analyzed to determine the possible relation between the quantity of iron ingested with the beverage and the level of this metal reserve in the body. All but three of the subjects were wine alcoholics. Three idiopathic hemochromatosis patients who did not consume alcohol were also studied. Using the desferrioxamine-B test, the mean value of iron in 24-hr urine was 1.33 mg for alcoholics, 1.10 mg for controls, and 2.50-28 mg for the patients with idiopathic hemochromatosis. Using the diethylenetriaminopenta-acetic acid test, the values of iron in the 6-hr urine for the same groups were 0.44 mg, 0.21 mg, and 0.52-8.21 mg, resp. In determining the iron concentration in the liver, part of the hepatic cylinder was preserved in a 5% formalin solution and another part of the same cylinder was kept in an absolute alcohol solution. Using the formalin solution, the amount of hepatic iron was 171.65 mg/100 g for the alcoholics and 84.76 mg/100 g for controls. Using the absolute alcohol determination, the corresponding values were 249.96 mg/100 g and 115 mg/100 g. There was no statistically significant relation between the quantity of iron ingested with the alcoholic beverage and the values obtained by the different methods for determining the reserve iron. Thus, the quantity of iron deposits in these alcoholics was independent of the quantity of metal ingested with the alcoholic beverage. These results do not support the theory that hemochromatosis is idiopathic. The three cases of primitive hemochromatosis tend to support the theory of the genetic origin of idiopathic hemochromatosis.

2915 TEST FOR ALCOHOLIC CIRRHOSIS BY CONVERSION OF [^{14}C]- OR [^{13}C]GALACTOSE TO EXPIRED CO_2. (Eng.) Shreeve, W. W.; Shoop, J. D.; Ott, D. G.; McInteer, B. B. (Veterans Admin. Hosp., Northport, NY 11768). *Gastroenterology* 71(1):98-101; 1976.

The rate of oxidation of an ingested C-labeled galactose load to expired carbon dioxide was measured to determine whether it could provide diagnostic information analogous to that of galactose clearance from the blood. Breath was collected from subjects at intervals for 4 hr, following ingestion of galactose (10 g/m^2) labeled with ^{14}C or ^{13}C. $^{14}CO_2$ was then measured by liquid scintillation counting, and $^{13}CO_2$ was measured by mass spectrometry. Nine subjects without liver disease and 21 cirrhotic patients were tested with ^{14}C. Eight control subjects and four patients with diagnosis of cirrhosis were tested with ^{13}C. The mean rates of expiration of labeled CO_2 by the patients with cirrhosis were one-third to one-half of mean normal rates during the first 90 min. The time of peak concentration of tracer CO_2 for cirrhotic patients (150-180 min) was later than for normal subjects (90-120 min). There was distinctly greater separation between control and liver disease groups by test of $^{14}CO_2$ radioactivity at 1 hr than by serum alkaline phosphatase, total bilirubin, and transaminase, but only slightly better separation than by serum albumin concentration (which was highly correlated with $^{14}CO_2$ output). It is concluded that the [^{14}C]galactose test is simpler than the standard i.v. galactose tolerance test and, like the latter, appears superior to some other tests for recognition of cirrhosis. The use of ^{13}C provides an example of a new direction for clinical application of this stable, nonradioactive nuclide.

2916 ALCOHOLIC HEPATITIS: CELL-MEDIATED IMMUNOLOGICAL RESPONSE TO ALCOHOLIC HYALIN. (Eng.) Zetterman, R. K.; Luisada-Opper, A.; Leevy, C. M. (New Jersey Medical Sch., Room 1501, 100 Bergen St., Newark, NJ 07103). *Gastroenterology* 70(3):382-384; 1976.

A purified isolate of alcoholic hyalin was added to lymphocytes from healthy subjects and patients with alcoholic hepatitis or other hepatic disorders (acute viral hepatitis, fatty liver, and inactive cirrhosis) to determine its relation to lymphocyte hyperreactivity to homologous liver. Production of migration inhibition factor (MIF) in response to this material was used as an index to lymphocyte reactivity. MIF was significantly increased in lymphocytes obtained from patients with alcoholic hepatitis, as compared to the healthy controls ($p<0.001$) and persons with other liver disease ($p<0.05$). These observations indicate that immunological hyperreactivity to alcoholic hyalin occurs in patients with alcoholic hepatitis. Such activity may be of key importance in the pathogenesis or sequelae (or both) of this disease.

2917 LIVER DISEASE OF THE ALCOHOLIC. (Eng.) Leevy, C. M.; Tamburro, C. H.; Zetterman, R. (Martland Medical Center, 100 Bergen St., Newark, NJ 07107). *Med. Clin. North Am.* 59(4):909-918; 1975.

2918 EARLY HEPATIC LESIONS IN ALCOHOLIC INTOXICATION. (Fre.) Degos, F. (Hopital Beaujon, 100, boulevard du General-Leclerc, 92110 Clichy, France). *Rev. Prat.* 26(10):741-742; 1976.

2919 ETHANOL METABOLISM AND ETHANOL-DRUG INTERACTIONS. (Eng.) Mezey, E. (Baltimore City Hosp., Baltimore, MD 21224). *Biochem. Pharmacol.* 25(8):869-875; 1976.

2920 POSSIBLE RELATION BETWEEN THE HEREDITARY ALPHA-1-ANTITRYPSIN DEFICIENCY OF HETEROZYGOUS TYPE AND ALCOHOLIC CIRRHOSIS IN ADULTS. (Fre.) Morin, T.; Martin, J.-P.; Feldmann, G.; Rueff, B.; Benhamou, J.-P. (Hopital Beaujon, 92110 Clichy, France). *Pathol. Biol. (Paris)* 23(7):551; 1975.

See also, 2676, 2910.

Cirrhosis

2921 ACID-BASE STATUS IN LIVER CIRRHOSIS: DISTURBANCES IN STABLE, TERMINAL AND PORTACAVAL SHUNTED PATIENTS. (Eng.) Prytz, H.; Thomsen, A. C. (Bispebjerg Hosp., Bispebjerg Bakke 23, DK-2400 Copenhagen N.V., Denmark). *Scand. J. Gastroenterol.* 11(3):249-256; 1976.

Acid-base status was determined in 86 patients with liver cirrhosis. Group 1 comprised 55 patients living over 3 months after examination (stable). Group 2 was composed of another 18 stable patients with a surgical portacaval shunt (p.c.a.). Group 3 consisted of 12 terminal patients without p.c.a. who were examined within the last week of life. With respect to liver function, group 2 was intermediate between 1 and 3. The most common acid-base disturbance in group 1 was compensated respiratory alkalosis (14 patients) followed by compensated metabolic alkalosis (9 patients). Nine patients in group 2 preented with compensated respiratory alkalosis. Eleven patients in group 3 showed metabolic acidosis, which was compensated in only half of the patients. Respiratory alkalosis seemed more related to impairment of liver function than to portasystemic shunting. The genesis of the terminal metabolic acidosis was complex. Renal function was reduced in 11 patients in group 3, and lactic acidosis was found in 4 patients. In this group, hepatic function was most severely impaired, and seven patients were hypotensive. These disturbances were not related to etiology or treatment of the liver disease. It is concluded that acid-base determinations be used in patients with deteriorating cirrhosis, because of their prognostic value.

2922 SERUM BILE ACIDS IN PRIMARY BILIARY CIRRHOSIS. (Eng.) Bloomer, J. R.; Allen, R. M.; Klatskin, G. (333 Cedar St., New Haven, CT 06510). *Arch. Intern. Med.* 136(1):57-61; 1976.

The use of serum bile acid levels to determine the severity and progression of primary biliary cirrhosis was studied. Fasting serum bile acid levels were measured by gas-liquid chromatography in 56 patients. Of these, 52 had increased levels (>2 μg/ml), including 14 of the 18 with normal serum bilirubin concentrations. The four patients with normal bile acid levels had early lesions, as judged by liver biopsy (minimal portal fibrosis and normal lobular architecture), and the lack of jaundice and pruritus. With progression of the disease, total bile acid levels increased, and the ratio of serum cholic-to-chenodeoxycholic acid decreased. Ratios of serum cholic-to-chenodeoxycholic acid below 1 occurred predominantly in patients with advanced or terminal disease. These studies suggest that serial measurement of serum bile acids may aid in the evaluation of primary biliary cirrhosis and that it is another objective factor with which to evaluate the effects of therapy.

2923 PLASMA ANGIOTENSIN ACTIVITY IN CIRRHOSIS OF THE LIVER AND IDIOPATHIC PORTAL HYPERTENSION. (Eng.) Dass, B. K.; Chaudhury, R. R.; Chhuttani, P. N.; Saini, V. K.; Datta, D. V. (Postgraduate Inst. Medical Education and Res., Chandigarh, India). *Indian J. Med. Res.* 64(3):418-424; 1976.

Plasma angiotensin activity was measured in 12 controls, in 30 patients with cirrhosis, in 10 patients with idiopathic portal hypertension, in 6 patients with extrahepatic portal vein obstruction, and in 5 patients with acute viral hepatitis. Plasma angiotensin activity was significantly elevated above levels in all of these clinical conditions ($p<0.001$). There was no significant correlation between liver function tests and plasma angiotensin activity. Patients with ascites had higher plasma angiotensin activity than patients without ascites (50.8 ± 16.02 ng/ml compared with 40.2 ± 5.18). Plasma clearance of infused angiotensin was delayed in cirrhosis and idiopathic portal hypertension. Infusion of angiotensin in peripheral and portal veins, separately in cirrhosis and idiopathic portal hypertension, revealed similar changes in systemic blood pressure and plasma angiotensin levels. However, in control subjects, the systemic blood pressure rose significantly when angiotension was infused in the peripheral vein; the response with portal infusion was not remarkable. It is concluded that reduced inactivation of plasma angiotensin is one of the causes of its high levels in acute and chronic liver disease.

2924 ALPHA 1-ANTITRYPSIN PHENOTYPES IN CIRRHOSIS AND HEPATOMA. (Eng.) Theodoropoulos, G.; Fertakis, A.; Archimandritis, A.; Kapordelis, C.; Angelopoulos, B. (Sch. Medicine, Univ. Athens, Athens-609, Greece). *Acta Hepatogastroenterol. (Stuttg.)* 23(2):114-117; 1976.

The relation between the protease inhibitor (Pi) system and the development of cirrhosis or hepatoma was investigated by determining the phenotypic distribution of α1-antitrypsin variants in 101 patients with cirrhosis, in 50 patients with both cirrhosis and hepatoma, and in 504 healthy controls. The ZZ and MZ phenotypes were found only once in the group of patients with cirrhosis. The very low Pi^z gene frequency suggests that the association of Pi^z gene with cirrhosis is fortuitous. The FM phenotype was observed in 14% of patients with hepatoma plus cirrhosis, and this incidence differed significantly between the two groups of patients and the controls. It is suggested that phenotypically FM cirrhotic patients are prone to the development of hepatoma.

2925 ALPHA-1 ANTITRYPSIN AND INDIAN CHILDHOOD CIRRHOSIS. (Eng.) Reddy, V.; Raghuramulu, N. (Indian Council Medical Res., Jamai-Osmania, Hyderabad-500007, India). *Indian J. Med. Res.* 63(9):1286-1288; 1975.

Serum α-1 antitrypsin activity was studied using benzoyl-d-arginine-*p*-nitro anilide as substrate in 10 normal children, in 20 children with Indian childhood cirrhosis, and in 3 subjects with other liver diseases. The antitrypsin activity in children with liver disease was similar to that of normal subjects (0.46-0.72 mg/ml), indicating that the deficiency of this protein is not related to Indian childhood cirrhosis. Genetic predisposition seems to be important in the development of this disease.

2926 EFFECTS OF PHOTOTHERAPY ON HEPATIC FUNCTION IN HUMAN ALCOHOLIC CIRRHOSIS. (Eng.) Knodell, R. G.; Cheney, H.; Ostrow, J. D. (Univ. New Mexico Sch. Medicine, Albuquerque, NM 87131). *Gastroenterology* 70(6):1112-1116; 1976.

The effects of phototherapy on bile acid kinetics, bile composition, serum liver function tests, and bromosulfophthalein (BSP) kinetics were examined in eight jaundiced patients with biopsy-documented alcoholic cirrhosis. Phototherapy was provided by four high intensity fluorescent bulbs that delivered 1000 foot candles of illumination at the body surface. Correlation coefficients for specific activity decay curves for cholic and chenodeoxycholic acid (CDC), during control and phototherapy periods, ranged from 0.01 to 0.99, and all regression lines were statistically significant at the $p<0.05$ level or less. There was a statistically significant increase in slope during phototherapy, for both bile acids ($p<0.01$, cholic and $p<0.05$), CDC). Biliary phospholipid concentrations increased ($p<0.02$), but no increase in cholesterol concentrations ($p<0.20$) was observed. Thin layer chromatography of both control and phototherapy bile samples revealed that over 98% of the bilirubin was conjugated. No significant changes in serum alkaline phosphatase, SGOT, albumin, or total protein occurred from the control period to the end of the study. It is concluded that phototherapy causes little improvement in intrinsic liver function, but it does produce specific changes in bile acid metabolism; these changes may be related to effects of light on a cutaneous bile acid pool.

2927 COMPARATIVE STUDIES OF THE ELECTROENCEPHALOGRAM AND THE CEREBRAL OXIDATIVE METABOLISM IN PATIENTS WITH LIVER CIRRHOSIS. (Eng.) Papenberg, J.; Lanzinger, G.; Kommerell, B.; Hoyer, S. (Medizinische Universitats-Klinik, D-6900 Heidelberg, Bergheimer Strasse 58, Heidelberg, W. Germany). *Klin. Worchenschr.* 53(23):1107-1113; 1975.

Comparative studies of the EEG and the cerebral oxidative metabolism were conducted in 24 fasting patients with liver cirrhosis to determine the extent to which disorders of cerebral oxidative metabolism occur. The patients were divided in two groups. The EEG in all patients of group A (8) was normal, while the patients of group B showed EEG changes of severity grade 3 (4), severity grade 4 (3), and severity grade 5 (1). The serum parameters for all patients were characteristic for hepatic insufficiency. Compared to group A, the serum albumin in group B (2.9 g/100 ml) was significantly lowered, and the total bilirubin (2.4 mg/100 ml) was significantly raised. The regularly raised ammonia levels in groups A and B (262 and 259 μg/ml, resp.,) were noteworthy. The prothrombin time (Quick value) was lowered, the alkaline phosphatase and SGOT were raised slightly, and the urea values were normal in both groups. The values for blood sugar, oxygen, carbon dioxide, and pH were normal in all patients of groups A and B. Cerebral oxygen consumption in the patients of Group B (2.5 ml/100 g/min was significantly lower than in group A. The lactate/glucose index (quotient) was raised in group A (0.03) and group B (0.17). The arterio-venous difference for ammonia was about 3.5 times higher in the patients of both groups. It is suggested that glucose and ammonia metabolism can be disturbed without simultaneous changes in the EEG (group A). The results from group B patients indicate that marked changes in EEG result only if cerebral oxygen consumption is reduced as well.

2928 EXOCRINE PANCREATIC FUNCTION IN HEPATIC CIRRHOSIS. (Eng.) Lee, S. P.; Lai, K. S. (Auckland Hosp., Auckland, New Zealand). *Am. J. Gastroenterol.* 65(3):244-248; 1976.

Exocrine pancreatic function was assessed in 13 patients with postnecrotic cirrhosis of the liver, 6 of whom had a splenorenal anastomosis for repeated variceal bleeding, and in 10 healthy controls. Pancreatic function was assessed by the standard test meal (TM) stimulation in all patients. The shunt patients had pancreatic function reassessed 3 months after operation by this test; three of these patients also had pancreatic function assessed by the secretin-pancreozymin (SP) stimulation test (using 2 clinical U/kg and 1.5 clinical U/kg, resp.) pre-operatively and 3 months after operation. There was no significant difference in mean trypsin concentration between the unoperated cirrhotic group and the controls; however, the volume of secretion was significantly higher in the former. The patients with splenorenal shunts showed a significant increase in the total volume recovered during the stimulation test ($p<0.001$) and in mean trypsin concentration ($p<0.05$). There was no appreciable difference in the volume and enzyme secretion when four unoperated patients with cirrhosis were reassessed after 4-14 months, and there was no difference in volume or output using either the TM or the SP test. It is concluded that there is no functional pancreatic impairment in postnecrotic cirrhosis as tested by these methods. The increases in volume and enzyme output after splenorenal shunt are probably due to a bypass of the liver with resultant impairment of hepatic degradation of pancreatic secretagogues.

2929 MANAGEMENT OF BLEEDING VARICES IN CIRRHOSIS: A CRITICAL EXAMINATION. (Eng.) Resnick, R. H. (Lemuel Shattuck Hosp., Boston, MA 02130). *Scand. J. Gastroenterol.* 10(7):673-678; 1975.

Traditional and new procedures for the management of bleeding varices in cirrhosis are examined. The choice of procedure (such as splenic venography, transhepatic venography, superior mesenteric angiography, or portal venography via the umbilical vein) depends upon specific patient needs and the expertise of attending clinicians. For the persistent bleeder, two modalities of non-operative treatment are available: a modification of the Sengstaken-Blakemore tube and selective intra-arterial vasopressin (VP) infusion. The end-side portacaval anastomosis (PCA) was introduced by Whipple in 1945. Results from controlled studies of prophylactic and therapeutic PCA, as well as experiences with portasystemic shunt in schistosomal (non-cirrhotic) hepatic disease led to the hypothesis that acute diversion of portal venous blood from the liver jeopardizes the functional integrity of that organ. A number of new procedures, designed to conserve total hepatic blood flow by varying methods include: the central side to side splenorenal shunt; an end to side distal splenorenal shunt coupled with isolation of the gastroesophageal venous circulation by ligating the coronary, right gastric, and right gastroepiploic veins; hepatic arterialization of the portal vein coupled with a standard end side portacaval shunt; and the mesocaval shunt employing a dacron H-graft prosthesis. Advocacy or rejection of these newer techniques can only be determined through prospective controlled trials.

2930 L-DOPA IN HEPATIC COMA. (Eng.) Fischer, J. E.; Funovics, J. M.; Falcao, H. A.; Wesdorp, R. I. C. (Massachusetts General Hosp., Boston, MA 02114). *Ann. Surg.* 183(4):386-391; 1976.

Experience with a heterogenous group of patients in hepatic coma, treated over the past 4 yr with L-Dopa, is presented. Thirty-five patients (mean age, 53 yr) with severe liver disease, including nutritional cirrhosis with acute coma and acute hepatitis, were treated. Four patients were judged grade III, and 31 patients were judged grade IV. All patients were previously treated with protein restriction, p.o.-administered nonabsorbable antibiotics, fluid and electrolytes, and in some cases, steroids. L-Dopa was given p.o. (500 mg at 4 hourly intervals) in 21 patients, and as a retention enema (500 mg at 6 hourly intervals) in 14. Thirteen of the 35 patients did not respond to therapy. Seventeen responded, but did not survive, and five patients responded and survived. There was no difference between any of the groups as far as dosage of L-Dopa and clinical features. In the survivors, therapy was started within 1.4 days after the onset of coma. In the patients who responded but did not survive, therapy was initiated at 6.7 days, and in the nonresponders, 9.5 days. These differences are highly significant. The results suggest that coma may pass from a reversible to an irreversible stage, and that initiation of L-Dopa therapy during the early stages of hepatic coma may be beneficial.

2931 INTERPOSITION GRAFTING FOR PORTAL HYPERTENSION. (Eng.) Thompson, B. W.; Read, R. C.; Casali, R. E. (Veterans Admin. Hosp., 300 E. Roosevelt Rd., Little Rock, AR 72206). *Am. J. Surg.* 130(6):733-738; 1975.

Experience with 37 patients who underwent interposition graft shunting during a 6-yr period is presented. The operation was performed in 33 cases for bleeding from varices and in 5 cases for intractable ascites. The procedure was elective in 27 cases and it was performed in an emergency in 11 cases. Autogenous jugular vein was used in 25 instances, homologous vena cava in 9, and Dacron in 4. Portacaval anastomoses were performed in 19 instances and mesocaval anastomoses in 19. There were five early deaths with one in the elective and four in the emergency group. Twelve grafts were open at autopsy, 15 at splenoportography, and 7 were assumed to be patent because the patients were asymptomatic. Two Dacron grafts and two homografts thrombosed. There were 10 late deaths, and only 1 was related to graft failure. Apparently, the operation controls ascites. Autogenous jugular vein appears to be the ideal material. It is concluded that interposition grafting is a simple, safe procedure that can be used for portal decompression in patients with bleeding varices.

2932 TRANSPOSITION OF THE SPLEEN IN RATS WITH PORTAL HYPERTENSION. (Eng.) Bengmark, S.; Borjesson, B.; Olin, T. (Dept. Surgery, Univ. Lund, Lund, Sweden). *Br. J. Surg.* 63(4):268-271; 1976.

The effect of subcutaneous transposition of the spleen on collateral circulation and portal pressure was studied in Sprague-Dawley rats with induced portal hypertension. Portal hypertension was induced in 36 animals by ameroid constrictors and in 30 animals by intragastric administration of 2.5 ml of a solution of dimethylnitrosamine (DMNA; 500 ppm) once a day for 3 consecutive days over 6 weeks. In the former group, subcutaneous transposition of the spleen was performed when the constrictor was applied, and for the latter group, it was performed 1 week before DMNA administration. In the constrictor group, parasplenic collaterals did not develop in animals, which were not subjected to subcutaneous transposition; however, in rats, which were subjected to the procedure, most of the collaterals were parasplenic, and the portal venous pressure fell. In the animals with DMNA-induced cirrhosis, most portasystemic collaterals were over the left renal vein in animals without transposition; in those with transposition, there were wide splenic collaterals. Collateral circulation in relation to the esophagus was absent in all animals.

2933 INDIRECT CONTRAST PORTOGRAPHY IN PATIENTS WITH PORTAL HYPERTENSION. (Rus.) Belan, A.; Benarek, I.; Vosmik, I. (Inst. Clinical and Experimental Medicine, Prague, Czechoslovakia). *Med. Radiol. (Mosk.)* 20(8):34-36; 1975.

2934 INTRAHEPATIC PRESSURE AS AN INDEX OF PORTAL PRESSURE. (Spa.) Urdaneta, A. B.; Morillo, A. V.; Nunez, A. P.; Albarran, H. B.

(Hospital Universitario de Maracaibo, Venezuela). *GEN* 28(2/3/4):111-118; 1974.

2935 HEMODYNAMIC CRITERIA FOR THE SELECTION OF SURGICAL INTERVENTION IN PATIENTS WITH PORTAL HYPERTENSION. (Spa.) Guarner, V.; Stoopen, M. (Hospital General, Centro Medico Nacional, Instituto Mexicano del Seguro Social, Mexico). *Rev. Med.* 13(3):213-221; 1974.

2936 RESULTS IN 71 CASES OF PORTACAVAL ANASTOMOSIS PREPARED FOR PORTAL HYPERTENSION. (Fre.) Saubier, E. C.; Lagoutte, J. (Hopital Ed.-Herriot, 69374 Lyon Cedex 2, France). *Lyon Chir.* 71(1):27-32; 1975.

2937 PORTAL HYPERTENSION IN THE COURSE OF SPLENOMEGALY AND TROPICAL HEPATOSPLENIC SYNDROMES IN CAMBODIA. (Fre.) Tournier-Lasserve, C. (Hopital d'Instruction des Armees, H. I. A., Laveran 13998, Marseille-Armees, France). *Med. Tropicale* 34(6):737-749; 1974.

2938 PORTAL HYPERTENSION IN TROPICAL HEPATOSPLENOMEGALIES. (Fre.) Carayon, A. (Institut de Medecine Tropicale, Service de Sante des Armees, 13998 Marseille-Armees, France). *Med Tropicale* 34(6):717-724; 1974.

2939 GASTRIC SECRETION AND SERUM PEPSINOGEN IN PATIENTS WITH LIVER CIRRHOSIS. (Ita.) Rossi, L.; Venuti, A.; Vestrini, C. (Istituto di Clinica Medica Generale e Terapia Medica dell'Universita Cattolica del S. Cuore, Rome, Italy). *Fegato* 20(1):51-60; 1974.

2940 CIRRHOSIS AND PREGNANCY (PRESENTATION OF FOUR CASES AND LITERATURE REVIEW). (Spa.) Berenguer, J.; Pertejo, V.; Sarrion, J. V.; Rayon, M.; Rodrigo, M.; Baguena, J. (Servicio de Medicina Digestiva, Ciudad Sanitaria, la Seguridad Social, Valencia, Spain). *Rev. Clin. Esp.* 135(3):275-283; 1974.

2941 TREATMENT OF HEPATIC ENCEPHALOPATHY FOLLOWING PORTAL SHUNT SURGERY IN CIRRHOTICS. (Fre.) Grange, D.; Bismuth, H. (Hopital Paul-Brousse, F 94800 Villejuif, France). *Arch. Fr. Mal. App. Dig.* 64(3):257-269; 1975.

2942 ENZYME INDUCTION IN PATIENTS WITH CIRRHOSIS. (Spa.) Escartin Marin, P.; Rossi, I. (Centro Nacional de Investigaciones Medico-Quirurgicas, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 45(6):605-612; 1975.

See also, 2797, 2805, 2812, 2827, 2836, 2840, 2847, 2850, 2882, 2887, 2894, 2907, 2911, 2912.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

2943 NEWER ANGIOGRAPHIC OBSERVATIONS IN CHOLANGIOCARCINOMA. (Eng.) Walter, J. F.; Bookstein, J. J.; Bouffard, E. V. (Palo Alto Medical Clinic, Palo Alto, CA). *Radiology* 118(1):19-23; 1976.

Three new angiographic features (bile duct dilatation, venous obstruction, and arterio-arterial collaterals) in the diagnosis and pre-operative evaluation of cholangiocarcinoma are described. These were noted in a review of angiograms from 15 cases of primary adenocarcinomas of the biliary tract. Dilatation of intrahepatic bile ducts was recognized in 67% of the cases and was usually best seen in the hepatoportagram phase of a high dose superior mesenteric artery injection augmented by tolazoline. Focal encasement of the portal vein was seen in 27% of the cases, and the obstruction was more proximal than that usually caused by pancreatic carcinoma. Arterio-arterial collaterals were seen in a single case. This patient was examined angiographically 4 times within 3 months. But in the fourth examination, a piece of partially necrotic tumor was obtained, enabling correct diagnosis. A confident prospective angiographic diagnosis of cholangiocarcinoma was made in 11 of the 15 patients. Because of its high reliability and the difficulties of operative diagnosis, angiography can play an important diagnostic role in patients with suspected cholangiocarcinoma.

2944 SEPSIS COMPLICATIONS IN ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY. (Eng.) James, E. C.; Collin, D. B. (West Virginia Univ. Medical Center, Morgantown, WV 26506). *Am. Surg.* 42(4):229-232; 1976.

Experiences with 71 endoscopic retrograde cholangiopancreatographic examinations in a group of 63 patients are presented. Successful cannulation was managed in 56 of the 63 patients and in 59 of the 71 examinations. Successful duct cholangiograms were obtained in 16 of 18 procedures in 15 patients with jaundice and in 10 of 13 procedures in 13 patients who were believed to manifest anicteric biliary tract disease. Successful duct pancreatograms were obtained in 23 of 25 procedures performed in 20 patients with proven chronic pancreatitis, in 8 of 13 procedures in 13 patients with suspected occult pancreatitis, and in both procedures performed in 2 patients with pancreatic trauma. Thus, success significantly outweighed failure in all patient categories except in the group with occult pancreatitis. Pseudocysts occurred in six cases of proven chronic pancreatitis; abscesses developed after cannulation in two patients. Both patients developed high fever, generalized toxicity, and gram-negative bacteremia and required immediate surgical drainage. Both patients survived, but not without a great deal of morbidity and extended hospitalization. Although this represented only a 2.8% overall incidence of infection, it constituted a 33.3% rate in the 6 patients with pseudocysts. It is recommended that routine endoscopic retrograde cholangiopancreatography be contraindicated in patients with suspected pseudocysts.

2945 DIAGNOSTIC ACCURACY OF ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY IN HEPATIC, BILIARY, AND PANCREATIC MALIGNANCY.

(Eng.) Silvis, S. E.; Rohrmann, C. A.; Vennes, J. A. (Veterans Admin. Hosp., 54th St. and 48th Ave. South, Minneapolis, MN 55417). *Ann. Intern. Med.* 84(4):438-440; 1976.

The accuracy of endoscopic retrograde cholangiopancreatography was evaluated in 84 patients with biopsy-proven pancreatic and biliary malignancy, and the diagnostic features of malignancy shared by both organ systems were clarified. In the 73 successful radiologic studies, a diagnosis of tumor was made in 67 patients (92%). The study was successful in 40 of 43 patients with pancreatic carcinoma and diagnosis was made in 37 on the basis of stenosis or obstruction of the ducts. There were 33 successful studies in the 41 patients with miscellaneous tumors, including primary bile duct, ampullary, gallbladder, metastatic carcinoma, lymphoma, and hepatoma. A diagnosis of tumor was made in 30 studies. The hallmark of malignancy in the pancreatic and biliary tract was determined to be obstruction and stenosis. This study indicates that malignant disease of the pancreas and biliary tract is accurately assessed by this endoscopic method.

2946 THE VALUE OF COMBINATION OF ANTEGRADE AND RETROGRADE CHOLANGIOGRAPHY IN THE DIAGNOSIS OF BILE DUCT OBSTRUCTION.

(Eng.) Huchzermeyer, H.; Luska, G.; Otto, P.; Seifert, E. (Medizinischen Hochschule, 3 Hannover, Karl-Wiechert-Allee 9, W. Germany). *Endoscopy* 7(3):126-133; 1975.

The advantages of combined antegrade (percutaneous transjugular cholangiography, PTC) and retrograde (endoscopic retrograde cholangiopancreatography, ERCP) cholangiography in the diagnosis of bile duct obstruction are illustrated in three cases. The limits of an adenocarcinoma were determined preoperatively in a 54-yr-old woman, using the combined technique. In a 60-yr-old man, ERCP, by choledocho-duodenostomy showed obstruction of the common bile duct 2 cm above the anastomotic stoma; this was thought to be carcinoma of the pancreas. PTC indicated that the upper part of the common bile duct was not visible and ruled out the possibility of anastomosis with an hepatic duct. In a 61-yr-old man with posthepatic cirrhosis, ERCP indicated an abruption of the common duct up to the cystic duct with an irregular contour, suggesting tumor compression. PTC revealed a narrowed upper choledochus duct, which appeared destroyed by tumor formation at the liver hilus. Surgery revealed a papillary adenocarcinoma originating from the bile duct. ERCP, PTC, peritoneoscopic, or percutaneous transhepatic cholangiography are the most suitable methods to determine the type and cause of bile duct obstruction preoperatively, in cases of severe jaundice. ERCP is considered to be most satisfactory in approximately 80% of the cases, but when the entire duct system cannot be visualized by this method, PTC may offer valuable information.

2947 TRANSJUGULAR APPROACH TO THE LIVER, BILIARY SYSTEM, AND PORTAL CIRCULATION.

(Eng.) Rosch, J.; Antonovic, R.; Dotter, C. T. (Univ. Oregon Health Sciences Center, 3181 S.W. Sam Jackson Park Rd., Portland, OR 97201). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(3):602-608; 1975.

Over 5 yr of clinical and animal experience with the use of a transjugular approach to the liver, biliary system, and portal circulation is reviewed. A catheter was inserted into an internal jugular vein (3-4 cm below the angle of the mandible) in humans and into the external jugular vein in animals. The procedure has been of clinical value in connection with hepatic manometry and venography, liver biopsy, and cholangiography. Satisfactory hepatic manometry and venography were achieved by the transjugular approach in all 47 attempted cases. Diagnostic liver specimens were obtained in 71 of 83 patients, and cholangiography was successful in 48 of 52 patients with enlarged intrahepatic ducts. No complications occurred with these studies. In animals, transjugular catheterization was used as a means for portal, mesenteric, and pancreatic venography. These procedures are ready for diagnostic clinical use. Therapeutic techniques explored in animals include intravascular tamponade of gastric coronary vein and the nonsurgical creation of intrahepatic portacaval shunts. It is suggested that both procedures show promise in the future management of massive gastrointestinal bleeding from varices.

2948 URSODEOXYCHOLATE--A COMMON BILE ACID IN GALLBLADDER BILE OF JAPANESE SUBJECTS.

(Eng.) Igimi, H. (Kyushu Univ., Fukuoka, 812, Japan). *Life Sci.* 18(9):933-1000; 1976.

Bile acid composition was investigated in normal gallbladder bile collected from 10 Japanese patients suffering from diseases other than those involving the hepatobiliary tract to determine the presence of ursodeoxycholate (UDCA). Bile samples were collected by aspirating from the gallbladder with a syringe at laparotomy. Standard commercial solutions of bile acids and free bile acids extracted from the bile of patients were derived to their methyl ester-trimethylsilyl ethers. They were determined by gas liquid chromatography on a column of 3% poly-phenyldiethanol amine succinate-80-100 mesh Chromosorb WHP. Average recoveries of added amount of standard bile acids ranged from 97-100%. UDCA was detected as a predominant bile acid in all cases tested and it represented an average of 5.7% of the total bile acids. In all but one case, its quantity was higher than that of lithocholate. The average percentage of the total bile acids for the other major acids was 40.3% for cholate, 17.0% for deoxycholate, and 35.5% for chenodeoxycholate. A higher content of UDCA than of lithocholate may indicate a reversible metabolic pathway where 7-ketolithocholate acts as an intermediate, and this pathway may be one of the protective processes in the body.

2949 HEPATIC PORTO-ENTEROSTOMY OR CHOLECYSTOSTOMY IN THE TREATMENT OF EXTRAHEPATIC BILIARY ATRESIA: A STUDY OF 49 CASES.

(Eng.) Odievre, M.; Valayer, J.; Razemon-Pinta, M.; Habib, E. C.; Alagille, D. (Hopital d'Enfants, 78 rue du General-Leclerc, 94270 Kremlin-Bicetre, France). *J. Pediatr.* 88(5):774-779; 1976.

The use of hepatic porto-enterostomy or hepatic porto-cholecystostomy was evaluated in the treatment of 49 infants with biliary atresia. Five infants died during the first 2 postoperative weeks; sepsis was the cause of death in four and unexplained gastrointestinal bleeding was the cause in one. Of the 44 patients who survived this period, cholestasis was not improved in 13 and bile flow was restored in 31. Of the 31 infants who excreted bile at the operation, 20 experienced repeated attacks of cholangitis with prolonged periods of fever and acholic stools. Death was directly related to cholangitis in three patients. Biliary leak with bile peritonitis occurred in six patients; four were treated with hepatic porto-cholecystostomy. Portal hypertension developed in 13/23 survivors 1 or more years after surgery. Twenty-one survivors of the postoperative period died during the subsequent 5-yr period. The mortality rate was 50% in infants who had surgery at less than 3 months of age and 59% in infants who had surgery at later ages. Of the 23 survivors, 8 are 3 yr of age or older; 6 are anicteric and free from pruritus, and 2 have chronic cholangitis. All eight have an enlarged, firm liver with extensive periportal scarring. Portal hypertension was confirmed in seven of the eight. Of the 15 surviving infants who are less than 3 yr of age, 7 suffer from chronic or recurrent cholangitis, 1 survived postoperative bile leakage with bile peritonitis, 5 have portal hypertension, and 7 have unrelieved cholestasis. One infant, 21 months of age, is free of abnormal findings. These results indicate significant improvement over earlier series. The findings also support the view that nearly all infants with biliary atresia who survive the first postoperative month develop chronic liver disease even when bile flow is restored.

2950 A VIEW ON THE AETIOLOGY OF EXTRAHEPATIC BILIARY ATRESIA WITH COMMENTS ON SURGICAL TREATMENT.

(Eng.) Puri, P.; Carroll, R.; O'Donnell, J.; Guiney, E. J. (Our Lady's Hosp. Sick Children, Dublin 12, Ireland). *Z. Kinderchir. Grenzgeb.* 17(1):44-55; 1975.

Clinical findings and treatment results of a series of 22 infants with biliary atresia are discussed. The site of atresia was diagnosed at laparotomy or autopsy. Jaundice was present at birth in 5 infants, it developed in less than a week in 11, and it developed in less than 4-5 weeks in 6 cases. Liver chemistries included: bilirubin, 3.5-25 mg/100 ml; conjugated bilirubin, 2.7-14.9 mg/100 ml; SGOT, 42-1,050 U; SGPT, 42-730 U; and alkaline phosphatase, 14-104 King Armstrong U. The anatomical abnormality involved atresia of the gallbladder and ducts in 13 cases, atresia of the common duct in 4, atresia of the hepatic duct in 1, and absence of the gallbladder and atresia of all ducts in 4. Surgery was performed at 1-6 months, and 4 of 22 patients had correctable lesions. Two of four were regarded as inoperable at laparotomy and the other two had choledochojejunostomy with Roux-en-y; one of these infants died and the other was alive at 14 months with abnormal liver chemistries and recurrent cholangitis. Of the 18 infants with incorrectable lesions, 8 had hepatic portoenterostomy with Roux-en-y and 5 had hepatic portojejunostomy. There were only five cases in which postoperative macroscopic evidence of bile excretion was observed. Eleven of 13 patients died within 22 months of surgery, and the other 2 were alive with evidence of progressive liver damage at 3 and 7 months postoperatively. It is concluded that hepatic portoenterostomy is probably a worthless procedure in the treatment of patients with incorrectable type extrahepatic biliary atresia. Pathological findings in this series included bile duct proliferation (18), bile duct retention (12), bile canaliculi retention (19), inflammation (19), fibrosis (18), thickening of hepatic arterial walls (7), cirrhosis (8), and liver cell damage (8).

2951 THE CONTINUING CHALLENGE OF GALLBLADDER CANCER: SURVEY OF THIRTY YEARS' EXPERIENCE AT THE UNIVERSITY OF CHICAGO.

(Eng.) Moossa, A. R.; Anagnost, M.; Hall, A. W.; Moraldi, A.; Skinner, D. B. (Univ. Chicago Hosp., 950 East 59th St., Chicago, IL 60637). *Am. J. Surg.* 130:57-62; 1975.

The records of 82 consecutive cases of gallbladder carcinoma in 21 men and 61 women are reviewed. Sixty-one of 82 patients had concomitant gallstones. Forty received no treatment, and of those treated, 28 had only surgery, 2 had surgery and irradiation, 5 received chemotherapy, and 4 had combined radiotherapy and chemotherapy. In the overall series, 42 died within 3 months of diagnosis, 57 died within 6 months, and 72 died within 1 yr. The overall 5-yr survival was 5% (4 patients). Of the 42 patients who were treated, 14 died within the first 3 months, but 19 were alive at 6 months, and 10 were alive at 1 yr; the 5-yr survival in this group was 9.5% (4 patients). In patients who were treated by only surgery, 22 of 28 survived the operation and the first 3 postoperative months, 14 were alive at 6 months, and 8 were alive at 1 yr; the 5-yr survival (same 4 patients) was 14.3%. Three men and seven women survived for more than 1 yr following the initial diagnosis. All ten had a preoperative history suggestive of cholelithiasis and cholecystitis of 6 months to 20 yr duration. Carcinoma was suspected at laparotomy in only four patients, and they all died at 14 months to 39 months post-diagnosis. Diagnosis was made on pathologic study in the six remaining patients. Among them, one died from metastatic gallbladder carcinoma at 22 months. Of the other five patients, one died at 22.5 yr from unrelated causes and another died at 6 yr from carcinoma of the floor of the mouth with no evidence of gallbladder carcinoma at the time of death. The remaining three were alive without evidence of disease at 12.5 yr, 6 yr, and 2 yr, resp. Of those receiving surgery and radiotherapy, one had obvious carcinoma at the time of the procedure and residual disease at 2.5 yr. Diagnosis was made by pathologic examination in the other. Histologically, anaplastic carcinoma extended to subserosal fat with lymphatic and perineural invasion. The only long term survivors were those in whom carcinoma was an incidental finding at surgery. It is concluded that there is adequate justification for cholecystectomy for reasons other than cancer when gallstones are discovered, especially when patients are above 50 yr of age.

2952 CARCINOMA OF THE AMPULLA OF VATER: REVIEW OF 38 CASES WITH EMPHASIS ON TREATMENT AND PROGNOSTIC FACTORS. (Eng.) Makipour, H.; Cooperman, A.; Danzi, J. T.; Farmer, R. G. (Cleveland Clinic Foundation, Cleveland, OH). *Ann. Surg.* 183(4):341-344; 1976.

Clinical information, laboratory data, and types and results of treatment in 38 cases of carcinoma of the ampulla of Vater are presented. The most common symptom was jaundice, and the diagnosis was confirmed at laparotomy in all patients. Three types of operation were performed: a pancreaticoduodenal resection in 23 patients, a biliary-enteric bypass in 7 patients, and a biliary-enteric bypass plus excision of tumor in 8 patients. The operative mortality was 8% following resection, 14% following bypass plus excision of the ampulla, and 13% following biliary-enteric bypass. Five patients survived for 5 yr or more. The two longest surviving patients had undergone pancreaticoduodenal resections (both were still alive at 216 months). The level of bilirubin or presence of pain did not correlate with prognosis. Prognosis was better in the absence of nodal metastases and in the presence of papillary tumors. The importance of screening and selecting candidates for the pancreaticoduodenal resection is stressed, because the 5-yr survival in the presence of regional or lymph node metastases is limited.

2953 ADENOCARCINOMA IN BILIARY PAPILLOMATOSIS. (Eng.) Neumann, R. D.; LiVolsi, V. A.; Rosenthal, N. S.; Burrell, M.; Ball, T. J. (Yale Univ. Sch. Medicine, 310 Cedar St., New Haven, CT 06510). *Gastroenterology* 70(5):779-782; 1976.

The case of a 45-yr-old man with multicentric biliary papillomatosis associated with invasive adenocarcinoma of the bile duct is presented. The patient had a 14-yr history of recurrent jaundice and diarrhea. Curettings of the bile ducts, obtained at laparotomy, showed a complex papillary neoplasm containing both adenomatous and mucous-secreting epithelium. One focus of marked epithelial atypia was noted, but no evidence of carcinoma was identified. Wedge liver biopsy disclosed marked bile stasis, portal and periportal fibrosis, cholangitis, and pericholangitis. At autopsy, left, right, and common hepatic ducts were found to contain papillomas. Histological examination of multiple sections of the bile ducts revealed moderate to severe nuclear atypia, mitoses, and multi-layering of epithelial cells in several papillomatous foci; these zones of atypia merged into an area of adenocarcinoma with invasion into the bile duct wall and periductular nerves and the proximal pancreatic duct. No metastases were identified. This case of biliary papillomatosis documents the progression to malignancy of a lesion, which is considered to be benign.

2954 GRANULAR CELL MYOBLASTOMA OF THE COMMON BILE DUCT: REPORT OF A CASE AND REVIEW OF THE LITERATURE. (Eng.) Dursi, J. F.; Hirschl, S.; Gomez, R.; Mersheimer, W. L. (New York Medical Coll., New York, NY). *Rev. Surg.* 32(5):305-310; 1975.

The case of a 35-yr-old woman with granular cell myoblastoma of the common bile duct is presented. Only three cases of granular cell myoblastoma of extrahepatic bile ducts have been published since 1960. The patient presented with a scaling rash and increasing jaundice and anorexia. A transhepatic cholangiogram immediately before operation showed near total obstruction of the common duct; the mass was extirpated, and T-tube drainage was performed. Because of persistent narrowing of the common duct and the nature of granular cell myoblastoma, total excision of the involved area of the common duct was performed 10 weeks later. The patient had complete recovery, without signs of recurrence after 18 months of follow-up. In general, the excision of benign tumors of extrahepatic bile ducts shows increasingly greater operative success.

2955 PRIMARY SCLEROSING CHOLANGITIS: A REPORT OF NINE CASES AND CLINICAL REVIEW. (Eng.) Danzi, J. T.; Makipour, H.; Farmer, R. G. (Cleveland Clinic Foundation, 9500 Euclid Ave., Cleveland, OH 44106). *Am. J. Gastroenterol.* 65(2):109-116; 1976.

ine cases of primary sclerosing cholangitis were eviewed to determine methods of diagnosis, associaion with other disease states, and clinical course f the patients. There were four cases of primary clerosing cholangitis occurring alone, four cases ssociated with inflammatory bowel disease (three ith chronic ulcerative colitis and one case with roctosigmoiditis), and one case associated with orphyria cutanea tarda. All cases of primary clerosing cholangitis occurring alone progressed o secondary biliary cirrhosis; however, none of the ases associated with chronic ulcerative colitis rogressed to secondary biliary cirrhosis. In all ases, the diagnosis was established by operative indings and biopsy results. The patients all resented with slowly progressive jaundice. The oentgenographic correlation of ductal involvement by ndoscopic retrograde cholangiography may enable orrect diagnosis pre-operatively and offer a method or evaluating the disease progression. The classiication of sclerosing cholangitis associated with lcerative colitis, as primary, is discussed. Theraeutic modalities are also discussed, although therapy s mainly empirical.

956 THE CHOLEDOCHOCELE: CORRELATION OF RADIOLOGICAL, CLINICAL AND PATHOLOGICAL FINDINGS.

Eng.) Scholz, F. J.; Carrera, G. F.; Larsen, C. R. Lahey Clinic Foundation, Boston, MA 02115). *Radioogy* 118(1):25-28; 1976.

wo cases of choledochocele are presented, and 14 ases reported in the literature are reviewed. Both atients were older women (59 and 73 yr) with everal years of intermittent biliary colic. The 9-yr-old patient underwent cholecystectomy, but he other patient was previously asymptomatic. Intravenous cholangiogram and upper gastrointestinal eries showed terminal club-like dilatation of the ommon duct, which bulged into the duodenal lumen s a smooth mass. These lesions proved to be bile-filled cysts receiving the common bile duct. Both filled with contrast material during cholangiography but not during the upper gastrointestinal series. The duodenal diverticulum filled on upper gastrointestinal series but not on cholangiography. The duplication cyst did not fill with either method.

2957 GALLBLADDER FUNCTION, CHOLESTEROL STONES, AND BILE COMPOSITION.

(Eng.) Antsaklis, G.; Lewin, M. R.; Sutor, D. J.; Cowie, A. G. A.; Clark, C. G. (Univ. Coll. Hosp. Medical Sch., University St., London WC1, England). *Gut* 16(12): 937-942; 1975.

Patients with pure cholesterol gallstones were investigated to determine a relation between bile composition and gallbladder function. Gallbladder bile, obtained at operation from five patients with no symptoms of biliary disease, was undersaturated with cholesterol in every case. However, gallbladder bile from five patients with stones, composed of 97-100% crystalline cholesterol, was normally saturated with cholesterol when the gallbladder was functioning and undersaturated when it was not. Regardless of gallbladder function, the patients with stones had significantly more cholesterol in their bile than the control group, but the differences between the mean composition of bile from functioning and nonfunctioning gallbladders were not significant. Common duct bile from patients with nonfunctioning and functioning gallbladders was supersaturated with cholesterol, but there was significantly more bile salt and significantly less cholesterol in the bile from patients with nonfunctioning gallbladders. Only in the case of patients with functioning gallbladders did the mean composition of the common duct and gallbladder biles differ significantly. The former contained significantly more cholesterol and less bile salt than the latter. It is suggested that patients with nonfunctioning gallbladders may be "auto-cholecystectomized" with the duct bile reverting to a more "normal" composition.

2958 THE MECHANISM OF INCREASED GALLSTONE FORMATION IN OBESE HUMAN SUBJECTS. (Eng.)

Mabee, T. M.; Meyer, P.; DenBesten, L.; Mason, E. E. (Univ. Iowa Coll. Medicine, Iowa City, IA). *Surgery* 79(4):460-468; 1976.

The hypothesis that obese subjects develop gallstones more frequently than normal subjects because of relative and absolute excess cholesterol excretion in bile was tested by determining the steady-state kinetics of biliary lipid excretion and bile acid pool sizes in eight healthy obese subjects without gallstones. Aliquots of resting gallbladder bile were obtained by aspiration on consecutive days. Hepatic bile excretion was constantly sampled during the infusion of a liquid isocaloric cholesterol-free formula containing a dilution indicator over two 12-hr periods on consecutive days. Gallbladder bile of seven of eight subjects was saturated consistently with cholesterol. Mean hourly hepatic cholesterol excretion in bile was 0.232 mM/hr, three times greater than that of normal subjects and twice that of subjects with gallstones. Phospholipid and bile acid excretion were 0.73 and 1.88 mM/hr, resp. The excretion rates of these cholesterol-solubilizing components of bile are higher than in normal subjects but are insufficient to compensate for the increased cholesterol excretion. The bile acid pool sizes were normal ($\bar{X}$=2.72 g), but the daily synthesis of bile acids was increased ($\bar{X}$=0.86 g of cholic acid). It is concluded that the clinically observed high correlation of cholelithiasis with obesity is due to increased hepatic secretion of cholesterol, which precipitates as cholesterol gallstones.

2959 TRANSIENT OBSTRUCTION OF THE COMMON BILE DUCT FOLLOWING ITS EXPLORATION. (Eng.)

Man, B.; Kraus, L.; Pikielny, S.; Horodniciano, S. (Meir Hosp., Kfar Sava, Israel). *Clin. Radiol.* 27(1):123-127; 1976.

Experience with 163 explorations of the common bile duct is presented, and 4 case studies are reported. Pseudo-obstruction of the bile duct appeared in 21 cases; calculi were found and removed in 16 of these. Intra-operative cholangiography through the T-tube, following exploration of the duct, failed to show contrast material in the duodenum, and a metal catheter passed freely into this area. In all cases, normal emptying was demonstrated in cholangiograms 8-10 days following the operation, and in 6 of these cases, pancreatic duct reflux appeared. No retained stones were disclosed. It is concluded that the obstruction was proximal to the sphincter of Oddi and was caused by spasm and edema of the choledochal sphincter of Boyden. In addition, the obstruction was shown to be transient and not caused by calculus stricture of tumor. The knowledge of possible pseudo-obstruction of the common bile duct, following its exploration, may save the surgeon from unnecessary re-exploration and from performing sphincterotomy or choledochoduodenostomy.

2960 DISSOLUTION OF CHOLESTEROL CALCULI: A THERAPEUTIC PROBLEM OF CURRENT INTEREST. (Ger.) Erb, W. (Kurklinik Bad Bocklet, 8733 Bad Bocklet, Lindenstrasse 9, W. Germany). *Med. Klin.* 70(28/29):1199-1207; 1975.

2961 CANCERS OF THE COMMON BILE DUCT: THE VALUE OF PRE-OPERATIVE TRANSPARIETO-HEPATIC CHOLANGIOGRAPHY. REPORT OF 31 CASES. (Fre.) Perissat, J.; Diard, F.; Gouffrant, J.-M.; Dubois, J.-P.; Doutre, L.-P. (Chaire de Clinique Chirurgicale, Universite de Bordeaux II, 311, boulevard du President Wilson, 33200 Bordeaux, France). *Ann. Chir.* 29(3):281-288; 1975.

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2966 INCIDENCE OF CHOLECYSTITIS IN SUBJECTS WITH DIFFERENT BLOOD GROUPS AND Rh FACTORS. (Rus.) Chinchenko, E. I.; Koshel', Iu. N. (Odessa Medical Inst., Odessa, USSR). *Klin. Med.* 53(11): 73-75; 1975.

2967 POLYPOID CARCINOMA OF THE HEPATIC DUCT SIMULATING VIRAL HEPATITIS. (Rus.) Shmurun, R. I. (Central Regional Hosp., Volkhov, USSR). *Klin. Med. (Mosk.)* 53(6):115-116; 1975.

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2971 EXTERNAL GALLBLADDER FISTULA AS A COMPLICATION OF CHOLELITHIASIS. (Rus.) Panchenkov, N. R.; Tartakovskii, E. A. (Hosp. No. 81, Moscow, USSR). *Khirurgiia (Mosk.)* (8):117-118; 1975.

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2977 ACUTE POST-TRAUMATIC CHOLECYSTITIS: ONE CASE. (Fre.) Delavierre, Ph.; Hureau, J.; Bourdais, J.-P. (Hopital Vaugirard, 389, rue

Vaugirard, 75015 Paris, France). *Sem. Hop. Paris* 51(23):1569-1571; 1975.

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2983 MINOR ACCIDENTS IN ORAL CHOLECYSTOGRAPHY. (Fre.) Djian, A.; Annonier, C.; Prouveur, Ph. (Hopital de Bobigny, 125, route de Stalingrad, F 93000 Bobigny, France). *J. Radiol. Electrol. Med. Nucl.* 56(8/9):613-614; 1975.

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2985 ACUTE SUPPURATING OBSTRUCTIVE CHOLANGITIS. (Spa.) Estrada, L.; Miyar, A. (Ciudad Sanitaria "Nuestra Senora Covadonga," Oviedo, Spain). *Rev. Esp. Enferm. Apar. Dig.* 46(1):37-40; 1975.

2986 ANATOMICAL CONSIDERATION OF THE HILAR PLATE AND ITS RELATION TO SURGERY ON THE HEPATIC DUCTS. (Spa.) Gramatica, L.; Sezin, M.; Aranega, C. I.; Olivares, P. E. (Figueroa Alcorta, 66, Cordoba, Argentina). *Rev. Esp. Enferm. Apar. Dig.* 45(6):613-624; 1975.

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See also, 2350, 2502, 2505, 2530, 2531, 2535, 2536, 2537, 2538, 2539, 2632, 2671, 2795, 2797, 2812, 2832, 2833, 2846, 2892.

GENERAL

2991 PLASMA TRACE METALS DURING TOTAL PARENTERAL ALIMENTATION. (Eng.) Solomons, N. W.; Layden, T. J.; Rosenberg, I. H.; Vo-Khactu, K.; Sandstead, H. H. (Univ. Chicago, Dept. Medicine, Chicago, IL). *Gastroenterology* 70(6):1022-1025; 1976.

The plasma concentrations of the trace metals zinc and copper were studied prospectively in 13 patients with gastrointestinal diseases treated with parenteral alimentation (TPA) for periods of from 8 days to 7.5 weeks. Plasma copper levels fell rapidly and consistently in all patients with an overall rate of -11 μg/100 ml/week. Zinc concentrations declined in 10 of 13 patients at a more gradual rate, -4.9 μg/100 ml/week. Analysis of the standard parenteral alimentation fluids revealed zinc content equivalent to 50% of the daily requirement (2.2 mg) and a negligible content of copper. Combined analysis of plasma zinc, hair zinc, and taste acuity, revealed that increased utilization or redistribution within the body may affect plasma concentrations in some patients. Neither an increase in urinary excretion nor a primary decrease in plasma binding proteins appeared to be a major factor in lowering plasma trace metal concentrations. These findings indicate that a marked decrease in plasma copper is regular and that a decline in plasma zinc is common during TPA using fluids that are unsupplemented with trace metals. It is recommended that parenteral alimentation fluids be supplemented with the trace metals zinc and copper.

2992 THE EVOLUTION OF ALPHA HEAVY CHAIN DISEASE. (Eng.) Guardia, J.; Rubies-Prat, J.; Gallart, M. T.; Moragas, A.; Martinez-Vazquez, J. M.; Bacardi, R.; Vilaseca, J. (Universidad Autonoma, Barcelona 16, Spain). *Am. J. Med.* 60(4):596-602; 1976.

Case reports of two patients with alpha heavy chain disease are presented, with emphasis on developmental pecularities. In the first patient (28-yr-old man), treatment with 100 mg cyclophosphamide, 20 mg prednisone, and 100 mg doxycycline was associated with a 28-month-long remission and the disappearance of the paraprotein and lymphoplasmocytic infiltration of the intestine. Shortly afterwards, a retroperitoneal immunoblastic lymphoma was found associated with an immunoglobulin G-kappa paraproteinemia and gamma heavy and kappa light chains in the urine. The intestinal biopsy specimen was normal. The patient's condition deteriorated progressively and he died. In the other patient (38-yr-old man), the alpha chain only appeared 2 yr after the malabsorption syndrome. Treatment consisted of tetracycline hydrochlorate (500 mg, 4 times daily) resulting in a rapid improvement in the patient's general condition and elimination of diarrhea, edemas, and hypoproteinemia. The patient was well 9 months later. The progression in the first patient suggests the existence of a B-cell neoplasia of different clone from that which gave rise to the original disease. In the second patient, it is probable that only the increase in the mass of neoplastic cells led to the detection of the protein abnormality, or alternatively, the antigenic oncogenic stimulus led to the abnormal secretion only after 2 yr.

2993 LOPERAMIDE: A NEW ANTIDIARRHEAL AGENT IN THE TREATMENT OF CHRONIC DIARRHEA. (Eng.) Galambos, J. T.; Hersh, T.; Schroder, S.; Wenger, J. (Emory Univ. Sch. Medicine, Atlanta, GA). *Gastroenterology* 70(6):1026-1029; 1976.

The effectiveness and safety of loperamide HCl, as an oral antidiarrheal agent, were investigated in 27 patients (15 men and 12 women) with chronic diarrhea due to Crohn's disease, ulcerative colitis, short bowel syndrome, and idiopathic (functional) causes, in a multiphase study. In the open phase study, loperamide was effective in controlling symptoms of diarrhea in 21 of 27 patients at a median daily dose of four capsules (2 mg each). The average number of daily stools decreased from eight during the relapse period to two stools after 1 month of treatment ($p=0.0001$). Efficacy was confirmed in the double blind (10 patients) and long term open phases of the study. Blood and urine analyses, ECG, and ophthalmic examinations revealed no significant alterations in values and observations which were obtained before and after loperamide therapy. Mean loperamide dosage remained at 8 mg/day for 6-18 months. No tolerance to the antidiarrheal effect was noted. Four patients who were not relieved during therapy discontinued the drug because of abdominal cramping. No other side effects attributable to the drug were observed. It is concluded that loperamide is a safe and effective agent for the treatment of chronic diarrhea.

2994 AN EPIDEMIC OF DIARRHOEA IN HUMAN NEONATES INVOLVING A REOVIRUS-LIKE AGENT AND 'ENTEROPATHOGENIC' SEROTYPES OF Escherichia coli. (Eng.) Bishop, R. F.; Hewstone, A. S.; Davidson, G. P.; Townley, R. R. W.; Holmes, I. H.; Ruck, B. J. (Royal Children's Hosp., Melbourne, Victoria, Australia 3052). *J. Clin. Pathol.* 29(1):46-49; 1976.

An epidemic of diarrhea in 15 of 32 neonates in one hospital is described. Rectal swabs were obtained from 28 of the 32 babies on admission to the ward, from the first baby to develop diarrhea on the day of onset, and from 11 of the other babies 4 days later; swabs were obtained from all 32 babies, 9 days after onset of the outbreak. Specimens were inoculated in various media and in tissue culture. Feces were extracted by differential centrifugation designed to reveal the reovirus-like particle implicated in the etiology of childhood enteritis. Reovirus-like particles were observed, either alone or in association with *Escherichia coli* serotypes, in 8 of the 15 babies with diarrhea and in 3 asymptomatic infants. During the 20 days of the epidemic, *E. coli* $O_{111}B_4$ was grown from the feces of 11 of the 15 babies with diarrhea and from the feces of 5 of the 17 asymptomatic babies. This organism was not identified in feces obtained on admission to the ward. Acquisition of the strain occurred 5-20 days after admission. Seven babies continued to excrete *E. coli* $O_{111}B_4$ for over 10 days after recovery; this usually lasted for 1-3 days. There was no rise in antibody titer to reovirus-like agent in three symptomatic babies infected with the virus. There was a four-fold rise in antibody titer in one asymptomatic baby who was infected with reovirus-like agent. One of the babies infected with *E. coli* $O_{111}B_4$ showed a rise in antibody titer from 1/20 to 1/80; titers from the other babies remained at 1/40. It is concluded that this epidemic was primarily caused by infection with the reovirus-like agent, even though it was not observed in all babies with diarrhea; failure to locate virus in these babies was due to imperfect timing of specimen collection. Because isolation of *E. coli* $O_{111}B_4$ from rectal swabs did not correlate well with the presence and absence of symptomatic illness, and none of the strains produced enterotoxin despite repeated testing, this strain was not implicated in the etiology of the epidemic. The results emphasize that strains of *E. coli* that are isolated from sporadic or epidemic diarrhea should not be assumed to be enteropathogenic on the basis of serotype alone.

2995 ACTIVATION OF INTESTINAL MUCOSAL ADENYLATE CYCLASE BY Shigella dysenteriae I ENTEROTOXIN.

(Eng.) Charney, A. N.; Gots, R. E.; Formal, S. B.; Giannella, R. A. (Walter Reed Army Medical Center, Washington, DC). *Gastroenterology* 70(6): 1085-1090; 1976.

The effect of *Shigella dysenteriae I* enterotoxin on adenylate cyclase activity in rabbit ileal mucosa was studied under various *in vitro* and *in vivo* conditions to study the mechanism by which this toxin induces intestinal secretion. Activation of adenylate cyclase by *Shigella* enterotoxin was observed only when substrate (ATP) concentrations above the Michaelis constant of adenylate cyclase were employed. These concentrations of ATP are greater than those required to demonstrate activation of adenylate cyclase by cholera toxin. Under optimal assay conditions, doses of *Shigella* toxin between 5.4-900 μg of toxin protein and *in vivo* incubation times between 6-18 hr all increased adenylate cyclase activity by about 100%. *Shigella* toxin produced significant but highly variable increases in mucosal cyclic AMP concentrations, which were less than the rises seen with a comparable dose of cholera toxin. This variability in cyclic AMP response to *Shigella* toxin and the disparity between *Shigella* and cholera toxins' effects on mucosal cyclic AMP are probably the result of the different kinetics of adenylate cyclase activated by these enterotoxins. Mucosal Na-K-ATPase activity was unaffected by *Shigella* toxin. These observations suggest that alterations in fluid and electrolyte transport induced by *Shigella* enterotoxin may, in part, be mediated by the adenylate cyclase-cyclic AMP system.

2996 AUTO-IMMUNE ATROPHIC GASTRITIS IN PATIENTS WITH DERMATITIS HERPETIFORMIS.

(Eng.) Stockbrugger, R.; Andersson, H.; Gillberg, R.; Kastrup, W.; Lundquist, G.; Mobacken, H. (Sahlgren's Hosp., Uppsala, Sweden). *Acta Derm-Venereol. (Stockh.)* 56(2):111-113; 1976.

Serum gastrin assay, intragastric bile salt assessment, and gastroscopic examination were undertaken in 17 patients with dermatitis herpetiformis (DH) to determine whether the megaloblastic anemia that appeared occasionally could be due to a lack of gastric intrinsic factor, as in pernicious anemia. Seven patients had achlorhydria. Five of the remaining 10 patients had low secretion of hydrochloric acid. Seven patients, four of whom were achlorhydric, had thyro-gastric antibodies; four were against cytoplasmic thyroidal antigen and five were against parietal cells. The serum gastrin level, which was determined by a radio-immunoabsorbant method, was significantly increased in the achlorhydric patients, compared with the reference group ($p<0.001$) as well as the patients without achlorhydria ($p<0.005$). Biopsy revealed that five patients with achlorhydria and elevated serum gastrin levels had pronounced atrophic gastritis or gastric atrophy of the corpus mucosa. The antral mucosa was normal in four patients and only slightly inflamed in the other patient. The concentration of intragastric bile salts was not increased in the patients studied, indicating that a reflux of bile salts into the stomach is probably not the cause of the gastric atrophy in DH. Atrophic gastritis in these patients probably had an auto-immune pathogenesis, as judged by elevated serum gastrin level, high prevalance of antibodies against parietal cells, and antrum sparing of the gastric atrophy. This type of atrophic gastritis is considered to indicate a precursor state to pernicious anemia.

2997 TRANSMISSIBLE GASTROENTERITIS: MUCOSAL ION TRANSPORT IN ACUTE VIRAL ENTERITIS.

(Eng.) McClung, H. J.; Butler, D. G.; Kerzner, B.; Gall, D. G.; Hamilton, J. R. (Pediatric Gastroenterology Children's Hosp., 561 17th St., Columbus, OH 43205). *Gastroenterology* 70(6):1091-1095; 1976.

Ion tranport in the jejunal mucosa of 14- to 16-day-old piglets with severe diarrhea was studied 40 hr after infection with transmissible gastroenteritis (TGE) virus. In infected pigs Na^+ transport failed to respond normally to glucose when studied either in Ussing short-circuited chambers or in suspensions of enterocytes isolated selectively from jejunal villi. Adding 10 mM theophylline to the chambers produced the same brisk electrical responses and increments in net Cl^- secretion in tissue from both infected and control groups. This defect in glucose-stimulated Na^+ absorption in the acute stage of a viral enteritis probably contributes to the impaired lumen-to-extracellular fluid flux of Na^+, which was found previously in the jejunum of intact TGE-infected pigs. The mechanisms causing diarrhea in this invasive viral enteritis differ from those causing toxigenic diarrhea.

2998 JEJUNAL ADENYLATE CYCLASE ACTIVITY IN HUMAN SUBJECTS DURING VIRAL GASTROENTERITIS.

(Eng.) Levy, A. G.; Widerlite, L.; Schwartz, C. J.; Dolin, R.; Blacklow, N. R.; Gardner, J. D.; Kimberg, D. V.; Trier, J. S. (Natl. Inst. Health, Building 10, Room 9D-15, Bethesda, MD 20014). *Gastroenterology* 70(3):321-325; 1976.

The jejunal adenylate cyclase activity was studied in a total of 23 normal subjects during viral gastroenteritis. The subjects were infected with an inoculum containing Norwalk or Hawaii agent (3.0-5.0 ml). There was a marked interindividual variation in the apparent specific activity of adenylate cyclase in the jejunal tissue obtained by biopsy. Such variation was minimized by expressing enzyme activity as a fraction of maximal that was stimulated by 10^{-2} NaF. Adenylate cyclase activity was not increased during diarrhea or illness in human viral gastroenteritis, suggesting that the adenylate cyclase system has no part in the pathogenesis of diarrhea in this common clinical entity.

2999 LOCAL AND SYSTEMIC CELL-MEDIATED IMMUNITY AGAINST TRANSMISSIBLE GASTROENTERITIS, AN INTESTINAL VIRAL INFECTION OF SWINE.

(Eng.) Frederick, G. T.; Bohl, E. H. (Biology Dept., Rochester

Inst. Technology, Rochester, NY). *J. Immunol.* 116(4):1000-1004; 1976.

The occurrence of local and systemic cell-mediated immunity (CMI) in swine against transmissible gastroenteritis (GE) virus was investigated. Leukocyte suspensions prepared from intestinal lamina propria (LP) and spleen were each incubated with and without inactivated TGE virus. The supernatants from these cultures were tested for the presence of macrophage migration inhibition factor (MIF) by the indirect MIF test, using guinea pig peritoneal exudate cells as the source of macrophages. All swine, which were serologically negative for TGE antibodies (i.e., unexposed to TGE virus) were also negative for MIF. Fourteen of 15 swine p.o. exposed to TGE virus 6-30 days before assaying for CMI gave a positive test for MIF production by both LP and splenic lymphocytes. The 15th animal, p.o. exposed to TGE virus 27 days before assaying, was negative for MIF production by both LP and splenic lymphocytes. In all nine of these exposed animals, where LP and splenic WBC suspensions contained equal numbers of lymphocytes, the percentage of migration inhibition by supernatants from LP preparations was significantly greater ($p \leq 0.01$) than by supernatants from spleen preparations. Two of three animals exposed to TGE virus 7-9.5 months before assaying for CMI were negative for MIF production by lymphocytes from both sources. In all 10 animals given TGE virus s.c., MIF production by splenic lymphocytes was significantly greater ($p<0.01$) than by LP lymphocytes, and in these animals, MIF production by LP lymphocytes was negligible (inhibition of migration<3%). The fact that CMI was detected early after initial exposure to virus indicates that it may play a role in recovery from a primary acute TGE infection.

3000 EFFICACY OF SELECTIVE SPLANCHNIC ARTERIOGRAPHY AND VASOPRESSIN PERFUSION IN DIAGNOSIS AND TREATMENT OF GASTROINTESTINAL HEMORRHAGE.

(Eng.) Johnson, W. C.; Wildrich, W. C. (Boston Veterans Admin. Hosp., 150 South Huntington Ave., Boston, MA 02130). *Am. J. Surg.* 131(4):481-489; 1976.

The effectiveness of selective splanchnic arteriography and vasopressin perfusion in the diagnosis and treatment of 81 bleeding patients was investigated. Patients who were diagnosed by endoscopy to have variceal bleeding from portal hypertension rarely (2 of 49) had a bleeding site that was visualized by angiography. Patients with arterial bleeding had the site determined in 10 of 32 cases. A total of 80% of the variceal bleeding patients who were treated by superior mesenteric artery perfusion with vasopressin had initial control of the gastrointestinal bleeding and 53% did not bleed again after removal of the catheter. This is a significant improvement over the 28% success rate with esophageal tamponade ($p<0.075$). Among 22 patients with a prothrombin level of less than 50%, initial bleeding control was obtained in 68% and final control was achieved in 27%. Of the 49 patients with bleeding due to portal hypertension, 35 died and 14 survived. Uncontrolled bleeding caused 11 deaths. These results suggest that visceral arterial infusion of vasopressin is the method of choice for the short term therapeutic management of massive gastrointestinal bleeding from portal hypertension.

3001 THE ACTION OF TRIGLYCYLVASOPRESSIN ON CONTROL SUBJECTS AND PATIENTS WITH UPPER GASTROINTESTINAL BLEEDING.

(Ger.) Aronsen, K. F.; Wetterlin, S.; Emas, S.; Vojtisek, V.; Mulder, J. L.; Cort, J. H. (Malmo General Hosp., S-21401 Malmo, Sweden). *Klin. Wochenschr.* 53(16):747-753; 1975.

Nα-glycyl-glycyl-glycyl-(8-lysine)-vasopressin, a hormone analogue with prolonged pharmacological action due to slow release of active nonapeptide by *in vivo* enzyme action, was administered to five control subjects and to 14 patients with active upper gastrointestinal bleeding. The control subjects showed a prolonged pressor response to 100 μg/kg of the hormone, associated with a rise in cardiac output, with no ECG signs of myocardial toxicity. Thirteen patients showed pressor responses, hemodynamic and clinical improvement, and clear signs of the cessation of bleeding when 20-100 μg/kg of Nα-glycyl-glycyl-glycyl-(8-lysine)-vasopressin was administered.

3002 JEJUNAL AND ILEAL CALCIUM ABSORPTION IN PATIENTS WITH CHRONIC RENAL DISEASE. EFFECT OF 1α-HYDROXYCHOLECALCIFEROL.

(Eng.) Vergne-Marini, P.; Parker, T. F.; Pak, C. Y. C.; Hull, A. R.; DeLuca, H. F.; Fordtran, J. S. (Univ. Texas Health Science Center, Dallas, TX 75235). *J. Clin. Invest.* 57(4):861-866; 1976.

Calcium absorption in 30-cm segments of small intestine from 26 normal subjects and from 12 patients with end-stage renal disease was measured by constant perfusion of test solutions containing different concentrations of calcium gluconate. In both the jejunum and ileum of the normal subjects, calcium absorption rates increased progressively as luminal calcium concentration was increased stepwise between 1 and 20 mM. Although calcium transport was not saturable within these limits, unidirectional flux ratios of calcium (^{47}Ca) suggest that calcium absorption is active in both the jejunum and ileum. Calcium absorption in the patients with chronic renal disease was markedly depressed in both regions of the small intestine. This was due to decreased flux out of the lumen; flux in the reverse direction was normal. Flux ratios in the renal disease patient showed no evidence of active calcium transport. Treatment of these patients for 1 week with 2 μg/day of 1α-hydroxycholecalciferol [1α-(OH)-D_3] restored net calcium absorption and unidirectional calcium flux out of the lumen to normal values in the jejunum; in the ileum, 1α-(OH)-D_3 increased calcium absorption 60-83% of normal at the various luminal calcium concentrations. 1α-(OH)-D_3 had no effect on unidirectional calcium flux into the lumen or on xylose and electrolyte absorption in either area of the small intestine. The results suggest that 1α-(OH)-D_3 therapy restores active calcium absorption in the jejunum and ileum of patients with chronic renal disease and that it has no effect on passive calcium diffusion from blood to lumen.

3003 GASTROINTESTINAL COMPLICATIONS AFTER RENAL TRANSPLANTATION: PREDICTIVE FACTORS AND MORBIDITY. (Eng.) Owens, M. L.; Wilson, S. E.; Saltzman, R.; Gordon, H. E. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90037). *Arch. Surg. (Chicago)* 111(4):467-471; 1976.

A ten-year study of 109 male patients who underwent renal transplantation was reviewed to identify categories of patients who had the greatest risk of developing gastrointestinal complications. Of the 109 patients, 37 developed gastrointestinal complications. The immediate mortality from these complications was 27%. Of 4 patients with erosive gastritis, 3 died; of the 17 who developed ulcers, 5 died. Emergency surgery for ulcers resulted in two deaths. It appears from this study that patients with peptic ulcer disease, esophagitis, or bleeding before transplantation are much more likely to develop recurrences. It was noted that peptic ulcer complications occurred much more frequently in recipients whose kidneys came from cadavers than from related donors. Experience with gastrointestinal bleeding, or its absence, during a first transplantation is a useful predictor of the results to be achieved after a second transplant. It is concluded that patients with well-documented peptic ulcer disease should either not be accepted for kidney transplantation or should undergo elective surgery for treatment of the ulcer first. Patients in whom ulcer disease develops after a kidney transplant should undergo early elective surgery for this condition. In this series, there was a relative infrequency of intestinal obstruction and intra-abdominal abscess as compared to other studies, perhaps relating to the fact that routine pretransplant splenectomy and bilateral nephrectomy were not performed in the current series.

3004 WATERBORNE TYPHOID FEVER IN DADE COUNTY, FLORIDA: CLINICAL AND THERAPEUTIC EVALUATION OF 105 BACTEREMIC PATIENTS. (Eng.) Hoffman, T. A.; Ruiz, C. J.; Counts, G. W.; Sachs, J. M.; Nitzkin, J. L. (Univ. Miami Sch. Medicine, P.O. Box 520875, Biscayne Annex, Miami, FL 33151). *Am. J. Med.* 59(4):481-487; 1975.

Clinical and therapeutic evaluation during an extensive outbreak of typhoid fever in a migrant worker camp in 1973 are discussed. In 188 cases with proved or presumptive typhoid fever, 105 patients had positive blood cultures for *Salmonella typhi*, 23 had positive stool cultures, 16 had positive serology, 6 had clinical relapse, and 38 cases were presumed to be typhoid. Sustained fever, usually above 38.8 C, was the most common sign in bacteremic patients (93%). Positive blood cultures were obtained in seven afebrile patients. Diarrhea and abdominal pain were more common than constipation as early manifestations. Hepatomegaly was present in 52% of the cases and splenomegaly was present in 42%. Rose spots were seen in only 13%, and bradycardia was infrequent. The WBC was normal in 74%, but SGOT, serum alkaline phosphatase, and LDH were frequently elevated. Gastrointestinal, pulmonary, and neurological complications were uncommon, and circulatory failure was not observed. Treatment consisted of either chloramphenicol (50 mg/kg/day, i.v. or p.o., until defervescence, then 25 mg/kg/day for a total of 14 days) or ampicillin (200 mg/kg/day, i.v., until defervescence, then 50-100 mg/kg/day p.o. for a total of 14 days). Responses to treatment were variable, but the median response time among 68 patients who were treated with chloramphenicol was 2 days less than that in the 34 patients who were treated with ampicillin. There was one possible treatment failure in the ampicillin group. Relapse rates did not differ significantly (10% with chloramphenicol, 3% with ampicillin). Serological studies were of little value since a titer of at least 1:160 was present in 49% of the patients prior to treatment, and only 24% of 57 cases exhibited a fourfold increase in titer. Serologic responses were not significantly different in the two treatment groups. It is suggested that when the infecting organism is sensitive to both antibiotics, ampicillin given parenterally until defervescence and then p.o. for a total of 14 days is a suitable alternative to chloramphenicol for the treatment of acute manifestations of typhoid fever.

3005 ROENTGENOGRAPHIC FINDINGS IN TYPHOID FEVER. (Eng.) Kabakian, H. A.; Nassar, N. T.; Nasrallah, S. M. (American Univ. Beirut Hosp., Beirut, Lebanon). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(1):198-206; 1975.

Barium meal examinations were performed on the small intestine in 20 patients with proved or clinically suspected typhoid fever. Following ingestion of 550 cm^3 of nonflocculable barium, 20 mg of metoclopramide were administered, i.v., to decrease the transit time through the intestine and to alleviate the severe nausea that some of the patients experienced. Barium reached the colon 1-2.5 hr. About 50% of the patients demonstrated very slight uniform dilatation of the ileum to 1.5 times the normal caliber. There was no jejunal dilatation. Contrary to other reports, no localized dilated segment, excessive secretion, prolonged spasm, or hyperperistalsis was demonstrated. Except for one case, the small intestinal abnormality was confined to the terminal 10-15 cm of the ileum. A total of 16 of 20 patients had a positive blood culture for typhoid fever. In 13 of the 16, roentgenographic changes were demonstrated. All four cases in which a positive culture was not obtained showed positive roentgenographic results. There were no untreated patients with a bacteriologically proved diagnosis in whom the roentgenographic study was negative. In all patients with positive findings. there was clearing of the roentgenographic abnormality following adequate treatment with chloramphenicol. No difference in the abnormality in patients suffering from *Salmonella typhi* or *paratyphi* infection were detected. This study demonstrates definite roentgenographic changes in the intestine associated with typhoid fever. It is suggested that the roentgenographic study may be the only way of confirming the typhoid fever diagnosis, when the clinical picture is suggestive, but the blood culture is negative.

3006 ACUTE ENTERITIS ASSOCIATED WITH REOVIRUS-LIKE AGENTS. (Eng.) Gomez-Barreto, J.; Palmer, E. L.; Nahmias, A. J.; Hatch, M. H. (Emory Univ. Sch. Medicine, Atlanta, GA 30303). *JAMA* 235(17):1857-1860; 1976.

3007 SERUM AND SMALL INTESTINAL IMMUNOGLOBULIN LEVELS IN UNDERNOURISHED CHILDREN. (Eng.) Bell, R. G.; Turner, K. J.; Gracey, M.; Suharjono; Sunoto. (Princess Margaret Children's Medical Res. Foundation, Perth, W. Australia). *Am. J. Clin. Nutr.* 29(4):392-397; 1976.

3008 Alcaligenes faecalis SEPTICAEMIA. (Eng.) Skegg, D. C. G. (Radcliff Infirmary, Oxford, England). *N.Z. Med. J.* 83(558):117-119; 1976.

3009 GASTROINTESTINAL CANCER: TREATMENT WITH FLUOROURACIL-NITROSOUREA COMBINATIONS. (Eng.) Moertel, C. G. (Mayo Clinic, Rochester, MN 55901). *JAMA* 235(19):2135-2136; 1976.

3010 MALIGNANT MELANOMA METASTASES TO THE ALIMENTARY TRACT. (Eng.) Fraser-Moodie, A.; Hughes, R. G.; Jones, S. M.; Shorey, B. A.; Snape, L. (Frenchay Hosp., Bristol, England). *Gut* 17(3):206-209; 1976.

3011 MALIGNANT GASTROINTESTINAL LYMPHOMAS: ANATOMICAL AND PATHOLOGICAL FINDINGS. (Fre.) Tabbara, W. S.; Gedeon, E. M. (Hopital Hotel-Dieu France, Beirut, Lebanon). *J. Med. Liban* 28(2):225-232; 1975.

3012 EMESIS IN INFANTS. (Fre.) de Paillerets, F.; Bouillie, C. (Hopital Louis-Mourier, 178, rue des Renouillers, 92700 Colombes, France). *Rev. Prat.* 26(4):210-211; 1976.

3013 ACQUISITION OF A B ANTIGEN BY GROUP A SUBJECTS: RESEARCH ON 200 PATIENTS FROM A DEPARTMENT OF GASTROENTEROLOGY [Letter to Editor]. (Fre.) Gerbal, A.; Salmon, Ch.; Lichtenstein, H.; Wagner, J. C. (Centre National de Transfusion Sanguine [Etablissement St-Antoine], 53, bd Diderot, F 75012 Paris, France). *Nouv. Presse Med.* 4(40):2885; 1975.

3014 SERUM IMMUNOGLOBINS IN INFANTS WITH ACUTE ENTERITIS: STUDY OF IgG, IgA, IgM AND COMPLEMENT C'3 COUNTS. (Fre.) Sateri, R.; Ilter, O.; Binatli, N.; Bilger, M. (Medical Faculty Cerrahpasa, Istanbul, Turkey). *Pediatrie* 30(6):567-571; 1975.

3015 "DIETETIC FIBERS." THEIR ROLE IN PATHOLOG (Fre.) Coste, Th.; Rautureau, J.; Gouffier, E. (Hopital Franco-Musulman, 125, rue de Stalingrad, 93009 Bobigny, France). *Nouv. Presse Med.* 4(37):2651-2654; 1975.

3016 OBTURATED CONSTRICTED HERNIA (CONCERNING SIX CASES). (Fre.) Grumillier, P.; Paquis, M. (Centre Hospitalier Regional de Nancy, 26, avenue de Lattre-de-Tassigny, 54000 Nancy, France). *Ann. Med. Nancy* 14:603-604, 607-608; 1975.

3017 USE OF INJECTABLE INDUSIL T IN A CLINICAL DEPARTMENT FOR DISEASES OF THE DIGESTIVE TRACT AND FOR NUTRITION. (Fre.) Monges, H.; Cougard, A. (Centre Hospitalier Universitaire Nord, Chemin Bourrelly, 13015 Marseille, France). *Sem. Hop. Ther.* 51(5/6):315-316; 1975.

3018 DIAGNOSIS AND TREATMENT OF THE MAIN TOXIC SYNDROMES CAUSED BY PESTICIDES. (Spa.) Quer Brossa, S. (No affiliation given). *Afinidad* 33(333):63-64; 1976.

3019 ZOLLINGER-ELLISON SYNDROME: DIAGNOSTIC PROCEDURE, MORPHOLOGY, TOTAL GASTRECTOMY [Abstract]. (Eng.) Peiper, H.-J.; Creutzfeldt, W. Becker, H.-D.; Fuchs, K.; Arnold, R. (Chirurgische u. Medizinische Universitatskliniken, Gottingen, W. Germany). *Langenbecks Arch. Chir.* 339:755; 1975.

3020 IMMUNOCYTES AND IMMUNOGLOBULINS OF THE DIGESTIVE TRACT DURING PRIMARY IMMUNE DEFICIENCY IN ADULTS. (Fre.) Matuchansky, C.; Goldfain, D.; Modigliani, R.; Galian, A.; Bernier, J. J. (Hopital Saint-Lazare, F 75475 Paris Cedex 10, France). *Nouv. Presse Med.* 5(6):357; 1976.

3021 AORTODUODENAL FISTULIZATION AS A COMPLICATION OF AORTIC BIFURCATION TRANSPLANT. (Dut.) De Belder, R. (St.-Elisabeth Ziekenhuis Coo Te Antwerpen, Belgium). *Tijdschr. Gastroentero* 18(1):31-34; 1975.

3022 ELEMENTAL DIET AND EXTERNAL FISTULAS OF THE DIGESTIVE TRACT. (Spa.) Ize Lamache L. I.; Gavino, J. F.; Carrasco, A.; Badial, F.; Moran, F.; Landa, L. (Hosp. General del Centro Medi Nacional, I.M.S.S., Mexico). *Prensa Med. Mex.* 40(1/2):3-10; 1975.

3023 SOME ETIOLOGIC AND CLINICAL PROBLEMS AND COMPLEX THERAPY OF ACUTE DIGESTIVE DISORDERS IN INFANTS. (Ukr.) Reshetkina, L. P.; Uni N. K. (Ivano-Frankovsk Medical Inst., Ivano-Franko USSR). *Pediatr. Akush. Ginekol.* 37(4):10-12; 1975

3024 ULCEROUS ENTEROCOLITIS IN YOUNG CHILDREN. (Ukr.) Dzendzelivs'ka, N. P. (Dept. Pediatric Pathology, Uzhgorod Univ., Uzhgorod, USSR). *Pediatr. Akush. Ginekol.* 37(5):18-20; 1975.

3025 FUNCTIONAL STATUS OF THE SMALL INTESTINE IN CHRONIC ENTEROCOLITIS. (Rus.) Bezzubik, K. V.; Zlatkina, A. R.; Misautova, A. A. (M. F. Vladimirskii Moscow Oblast Scientific Res. Clinical Inst., Moscow, USSR). *Ter. Arkh.* 47:131-136; 1975.

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GENERAL

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3050 THERAPEUTIC APPROACH TO COMMON INTESTINAL PARASITOSES IN PEDIATRICS. (Spa.) Hauck, I. N. (Departamento de Medicina Experimental, Sede Oriente, Universidad de Chile, Chile). *Rev. Chil. Pediatr.* 46(1):63-69; 1975.

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GENERAL

Regional Enteritis

3052 CROHN'S DISEASE OF THE COLON: ANALYSIS OF THE DIAGNOSTIC VALUE OF RADIOLOGY, ENDOSCOPY, AND HISTOLOGY. (Eng.) Meuwissen, S. G. M.; Pape, K. S. S. B.; Agenant, D.; Oushoorn, H. H.; Tytgat, G. N. J. (Div. Gastroenterology, Wilhelmina Gasthuis, Amsterdam, Holland). *Am. J. Dig. Dis.* 21(2):81-88; 1976.

The diagnostic value of radiology, endoscopy, and biopsy in Crohn's disease of the colon was analyzed in 15 patients. Radiologic findings were considered of diagnostic value in only six patients. Characteristic endoscopic lesions were found in 13 patients, and diagnostic histologic features were found in 11. Endoscopy combined with biopsy was diagnostic in all 15 cases. The extent of involvement by endoscopy frequently disagreed with the radiologic assessment, particularly in the rectosigmoid area. Studies in eight patients indicated that sigmoidoscopy and colonoscopy with multiple biopsies provide an accurate alternative to radiology to estimate the extent and severity of the lesions and their evolution during corticosteroid and/or azathioprine treatment.

3053 IMMUNOFLUORESCENCE STUDIES OF GASTRIC HETEROTOPIA OF THE SMALL INTESTINE IN CROHN'S DISEASE. (Eng.) Lechago, J.; Black, C.; Samloff, I. M. (Harbor General Hosp., 1000 West

Carson St., Torrance, CA 90509). *Gastroenterology* 70(3):429-432; 1976.

Immunofluorescence and other morphologic studies were performed on a resected ileum, with extensive areas of pyloric and oxyntic gland metaplasia, from a 49-yr-old woman with Crohn's disease. Most metaplastic glands were of the pyloric type, but numerous oxyntic glands with parietal and chief cells were also observed by light microscopy. The immunofluorescence studies showed that the chief cells contained only the group II pepsinogens. Gastrin-containing or other endocrine cells were not detected in the metaplastic pyloric and oxyntic glands. The latter findings are consistent with the concept that the endocrine and exocrine cells of the gastrointestinal mucosa may originate from different precursor elements during embryogenesis.

3054 SERUM AND INTESTINAL FLUID IMMUNOGLOBULINS AND JEJUNAL IgA SECRETION IN CROHN'S DISEASE.

(Eng.) Jones, E. G.; Beeken, W. L.; Roessner, K. D.; Brown, W. R. (Veterans Admin. Hosp., 1055 Clermont St., Denver, CO 80220). *Digestion* 14(1): 12-19; 1976.

Immunoglobulins A, G, M, and E in serum and in proximal intestinal fluids and secretion of IgA by cultured jejunal mucosa were measured by radial immunodiffusion or double-antibody radioimmunoassay in 12 healthy subjects and in 36 patients with Crohn's disease. Immunoglobulin concentrations in the serum and intestinal fluids were similar in the patients and the controls, except that serum IgA concentrations in the patients were elevated in comparison with controls (1.85 mg/ml in patients compared to 1.09 in healthy subjects, $p<0.01$). Elevation of IgA and chronicity of the disease were correlated; 12 patients with symptoms for 2 yr or less had levels of 1.64 mg/ml (not significantly different from normal), whereas 19 patients with symptoms of longer duration had 2.09 mg/ml ($p<0.01$). This suggests that the IgA alteration was a response to duration of disease rather than a primary pathogenetic factor. IgA secretion by cultured jejunum was similar in control and patient groups. This suggests that there is no generalized intestinal defect in the secretory IgA system in Crohn's disease.

3055 IMPAIRED ANAMNESTIC CELLULAR IMMUNE RESPONSE IN PATIENTS WITH CROHN' DISEASE.

(Eng.) Meuwissen, S. G. M.; Schellekens, P. T. A.; Huismans, L.; Tytgat, G. N. (Div. Gastroenterology, Wilhelmina Gasthuis and Binnengasthuis, Univ. Amsterdam, Amsterdam, Holland). *Gut* 16(11):854-860; 1975.

The cellular immune system was studied in 54 patients with Crohn's disease (CD) who were not receiving corticosteroids or azathioprine by means of *in vitro* and *in vivo* methods. The *in vitro* lymphocyte reactivity of these patients after stimulation with a cocktail of antigens (varidase, trichophyton, candida, mumps, and purified protein derivative of tuberculin) was significantly depressed when compared with the response of 20 simultaneously cultured healthy controls ($p<0.001$) or a group of 54 separately cultured healthy controls, matched for age and sex ($p<0.001$). The lymphocyte response of a control group of 18 patients with malnutrition or malabsorption, without any evidence of inflammatory bowel disease, was higher than the response of an equal number of CD cases, although the difference failed to reach significance. Intradermal injection of the same five antigens showed a failure to react to any antigen in 13 out of 48 CD patients, in comparison with 3 out of 48 matched healthy controls ($p<0.01$). In both CD patients and in healthy controls, a significant correlation was demonstrated between the number of positive skin tests, the area of skin induration, and the *in vitro* lymphocyte responsiveness after stimulation with the antigen cocktail. In the CD group, no correlation was found between *in vitro* responsiveness and disease activity. The depressed skin reactivity and the hyporesponsiveness in the lymphocyte transformation test, after stimulation by an antigen cocktail, suggest that depression of the anamnestic cellular immune response is a basic feature in patients with Crohn's disease.

3056 ROLE OF THE GRANULOMA IN RECURRENT CROHN'S DISEASE.

(Eng.) Glass, R. E.; Baker, W. N. W. (Gordon Hosp., London, England). *Gut* 17(1): 75-77; 1976.

The relation between the presence of sarcoid-like granulomata in the bowel and associated mesenteric lymph nodes in patients with Crohn's disease and the subsequent course of the disease was investigated in 90 patients during a 5-22 yr followup period. The recurrence rate in the 30 patients without granuloma was almost twice that of the 60 patients with granulomata in their initial operation specimens ($p<0.025$). There were no significant differences between the granulomatous and nongranulomatous patients in sex incidence, of disease recurrence, age at initial presentation, length of history before operation, disease site, pattern of recurrence, type of operation, or occurrence of fulminating disease. In the 18 patients with no sarcoid-like granulomata at primary excision, 9 patients subsequently demonstrated granulomata in their recurrent disease specimens. It is suggested that sarcoid-like granulomata reflect the patients' immune response. It is concluded that granulomatous and nongranulomatous patients do not differ other than in the increased recurrence rate in nongranulomatous disease.

3057 REVERSAL OF GROWTH ARREST IN ADOLESCENTS WITH CROHN'S DISEASE AFTER PARENTERAL ALIMENTATION.

(Eng.) Layden, T.; Rosenberg, J.; Nemchausky, B.; Elson, C.; Rosenberg, I.; (Univ. Chicago, Box 400, 950 E. 59th St., Chicago, IL 60637). *Gastroenterology* 70(6):1017-1021; 1976.

To assess whether a sustained high caloric and nitrogen intake could re-establish growth, four children with extensive Crohn's disease of the small bowel were studied before and after parenteral alimentation, which was instituted for symtomatic disease control. Weight gain, positive nitrogen balance, and improved nutritional status were achieved during parenteral alimentation in each patient. In two 11-yr-old boys, weight gain was sustained using p.o. nutritional supplements, and a substantial increase in linear skeletal growth continued in the ensuing months. One patient, a 17-yr-old boy, entered puberty within 4 months of parenteral alimentation; the fourth patient, a 17-yr-old girl, had the onset of menarche and the development of secondary sex characteristics 4 months after parenteral alimentation and resection of diseased bowel. Growth may be re-established in some growth-arrested children if intake is sufficient to establish a sustained positive caloric and nitrogen balance. Nutritional requirements imposed by the demands of growth and active disease and often compounded by the catabolic effects of corticosteroids may be excessive; growth may occur only if these needs are met orally and/or parenterally.

3058 SERUM GASTRIN RESPONSE TO FOOD STIMULATION AND GASTRIC ACID SECRETION IN MALE PATIENTS WITH ILEAL RESECTION. (Eng.) Gedde-Dahl, D.; Fausa, O. (Natl. Hosp. Norway, Rikshospitalet, Oslo 1, Norway). *Scand. J. Gastroenterol.* 10(7):679-682; 1975.

Gastric acid secretion before and after stimulation with pentagastrin (6 μg/kg, s.c.) and serum gastrin response to a test meal were compared in nine healthy men and in seven men from whom more than 50 cm of the terminal ileum was resected because of Crohn's disease. The mean gastric acid secretion before and after stimulation was not significantly different in the two groups. The mean fasting serum gastrin concentration and the serum gastrin response in absolute values were similar in the two groups (54.7 ± 8.5 pg/ml in Crohn's disease and 42 ± 5.5 pg/ml in controls). The "maximal" acid output-"basal" acid output/"integrated gastrin response" was higher ($p<0.05$), and the gastrin response in relation to fasting level was lower in the patients than in the controls ($p<0.05$). The results indicate that an increased parietal cell sensitivity to gastrin is present after ileal resection. The negative acid feedback mechanism, however, seems to be at work. Under physiological conditions, therefore, the increased sensitivity may not result in acid hypersecretion.

3059 BOWEL MUCOSA IN CROHN'S DISEASE. (Eng.) Ruddell, W. S. J.; Lovell, D.; Blendis, L. M. (Central Middlesex Hosp., London, NW10 7NG, England). *Lancet* 1(7958):539-540; 1976.

3060 PROTEIN PATTERNS IN SERUM AND PERITONEAL FLUID IN CROHN'S DISEASE AND ULCERATIVE COLITIS. (Eng.) Haglund, U.; Hulten, L. (Sahlgren's Hosp., Goteborg, Sweden). *Acta Chir. Scand.* 142(2):160-164; 1976.

3061 ENZYMATIC AND QUANTITATIVE HISTOLOGICAL EVIDENCE FOR CROHN'S DISEASE AS A DIFFUSE LESION OF THE GASTROINTESTINAL TRACT [Abstract]. (Eng.) Dunne, W. T.; Allan, R.; Cooke, W. T. (General Hosp., Birmingham, England). *Gut* 17(5): 399; 1976.

3062 INDUCTION OF GRANULOMA IN CBA AND A_2G STRAIN MICE BY CROHN'S DISEASE TISSUE HOMOGENATES [Abstract]. (Eng.) Cave, D. R.; Mitchell, D. N.; Brooke, B. N. (St. George's Hosp. Medical Sch., London SW17, England). *Gut* 17(5): 400; 1976.

3063 IMMUNE ELECTRON MICROSCOPY FOR VIRAL PARTICLES IN CROHN'S DISEASE [Abstract]. (Eng.) Whorwell, P. J.; Baldwin, R. C.; Wright, R. (Southampton General Hosp., Southampton, England). *Gut* 17(5):399-400; 1976.

3064 THE DEMOGRAPHIC AND SOCIAL CHARACTERISTICS OF PATIENTS WITH CROHN'S DISEASE IN THE NOTTINGHAM AREA. (Eng.) Keighley, A.; Miller, D. S.; Hughes, A. O.; Langman, M. J. S. (Medical Sch., Univ. Nottingham, Nottingham, England). *Scand. J. Gastroenterol.* 11(3):293-296; 1976.

See also, 2503, 2758, 2759, 2760, 2771, 2773, 3032.

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GASTROENTEROLOGY

ABSTRACTS AND CITATIONS

NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED_{50}	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
μg	microgram(s)
Hz	Hertz
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K_m	Michaelis constant
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
μM	micromolar; micromole(s)
ma	milliampere(s)
mCi, μCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)
ml, μl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

3065 HISTOENZYMATIC AND ULTRASTRUCTURAL FINDINGS IN THE HUMAN GASTRIC MUCOSA DURING FASTING. (Eng.) Zavicic, M.; Brozman, M.; Jakubovsky, J.; Duris, I.; Koska, M.; Holly, D. (Medical Sch., Komensky Univ., Bratislava, Czechoslovakia). *Gastroenterol. Jpn.* 10(4):261-270; 1975.

The influence of fasting on the structure of the human gastric mucosa was studied using selective histoenzymological and electron microscope methods. Biopsy specimens of the mucosa of seven healthy volunteers were examined after 24-240 hr of fasting. During fasting, an increased acid phosphatase activity in the chief cells of the human fundal mucosa was observed. The activity of the nonspecific esterase (naphtyl esterase) in the chief cells decreased mostly after 240 hr of fasting. A multiplication of lysosomes and narrowing of the granular endoplasmic reticulum was observed in the chief cells during fasting. In some chief cells agglomeration of zymogen granules was seen, while in others only a few granules were observed. In the parietal and other gastric gland cells, steatosis, which attained excessive values, was seen after 72 and 240 hr of fasting. The authors believe that this was due to fasting lipemia. The changes in the mitochondrial structure of the parietal and other gastric mucosa cells were only slightly pronounced. The decreased activity of dehydrogenase in the steatotic parietal cells may be due to the agglomeration of a large amount of lipid drops in the steatotic cells. After 72 and 240 hr of fasting, the parietal cells contained collapsed, underdeveloped intracellular canaliculi and narrowed tubulovesicular profiles, which was probably related to the decreased HCl production. It is concluded that the observed morphological changes result from the decreased function of gastric mucosa cells during fasting, and that these regressive changes are reversible.

3066 HEPATIC ENCEPHALOPATHY AND LIGHT AND ELECTRON MICROGRAPHIC CHANGES OF THE BABOON LIVER AFTER PORTAL DIVERSION. (Eng.) Putnam, C. W.; Porter, K. A.; Starzl, T. E. (Univ. Colorado Medical Center, 4200 East Ninth Ave., Denver, CO 80220). *Ann. Surg.* 184(2):155-161; 1976.

The effects of complete portal diversion were studied in six baboons of varying weights and estimated ages. All animals became emaciated and lost hair. Five animals developed hepatic encephalopathy so serious that it either killed them or required their sacrifice after an average of 109 days. One exceptional animal that lived for 208 days without encephalopathy had markedly elevated blood ammonia levels (443 μg/100 ml, normal<50). In one brain that was examined, greatly increased numbers of Alzeheimer's type II astrocytes were diffusely distributed in the cerebral cortex. Changes in liver function tests were similar to those previously reported in dogs; SGOT, SGPT, and alkaline phosphatase levels were elevated in all animals, while bilirubin remained at normal levels. The livers of all six baboons underwent striking atrophy during the 49-208 days of postoperative observation. With some variations in degree, the observed light and electron microscopic changes (i.e., hepatocyte atrophy and tendency toward fat accumulation, depletion of rough endoplasmic reticulum, and increased number of hepatocytes in mitosis) were the same as those previously seen after complete portacaval shunt diversion in rats, dogs, and humans. Thus, the hepatic injury of Eck fistula is common to all species that have been studied.

3067 MODE OF GROWTH OF THE JEJUNAL CRYPT CELLS OF THE RAT: AN AUTORADIOGRAPHIC STUDY USING DOUBLE LABELLING WITH ^{3}H- AND ^{14}C-THYMIDINE IN LOWER AND UPPER PARTS OF CRYPTS. (Eng.) Burholt, D. R.; Schultze, B.; Maurer, W. (Allegheny General Hosp., 320 East North Ave., Pittsburgh, PA 15212). *Cell Tissue Kinet.* 9(2):107-117; 1976.

The frequency distribution of cells through the mitotic cycle in lower and upper portions of jejunal crypts of the Wistar rat was examined by the ^{3}H-^{14}C-thymidine double labeling technique. Isolated crypts were cut perpendicular to the longitudinal axis so that the percentage of cells in the lower portion varied from 16 to 74%. The lower and upper portion of the same crypts were squashed separately on one microscope slide and the number of ^{3}H- and ^{14}C-only labeled cells were scored to determine the flow rate into and out of S for the two portions. For lower portions of crypts, which contained less than 40% of the total cell number in that crypt, the flow rate into S was about 1.7 times that of the flow rate out of S. As the proportion of cells in the lower part of the crypt increased, the quotient of the flow rate into S divided by the flow rate out of S decreased, and approached the steady state value of 1.0 in lower portions containing 60-74% of the cells. For upper portions of crypts, which contained less than 40% of the total crypt cells, the flow rate into S was about 0.2 times that of the flow rate out of S. The results indicate that in the lower third of the rat jejunal crypts, the frequency distribution of the cells throughout the cycle corresponds to that of an exponentially growing cell population; each mitosis leads to two proliferating daughter cells. The number of cells per unit time at the beginning of the cycle is then double that at the end. In the upper parts of the crypts, the number of cells per unit time is greater at the end of the cycle than at the beginning. In this case, mitotic division predominantly leads to differentiating cells.

3068 THE CYTOLOGICAL EFFECTS OF INFUSION OF LUMINAL POLYETHYLENE GLYCOL ON THE RAT SMALL INTESTINAL MUCOSA. (Eng.) Clarke, R. M.; Kobayashi, S. (Nottingham Univ. Medical Sch., Nottingham, England). *Arch. Histol. Jpn.* 38(2):133-150; 1975.

The cytological effects of infusion of luminal polyethylene glycol (PEG) on the rat small intestinal mucosa were investigated in 17 male albino Wistar rats. An isolated sac of rat upper small intestine was prepared, and its lower end was drained to the skin. Solutions of known volume and composition were infused (4 ml/hr) into the sac, and the intestinal mucosa was examined by light and electron microscopy. Infusion of isosmotic PEG resulted in prompt and progressively severe damage to enterocytes at the top of the villus, while goblet cells and basal granulated cells were apparently unaffected. Thus, after 6-72 hr, a cap of goblet cells and basal granulated cells accumulated at the top of the villus, while the enterocytes underwent vacuolation and disintegration. Infusion of an isosmotic mixture of 1% PEG and 5.1% glucose caused no damage near the site of infusion, but it damaged the intestinal sac further distally. The infusion of distilled water also damaged enterocytes, but the pattern of damage was different from that seen with PEG. Changes were restricted to the upper end of the isolated sac. No abnormality was seen either in the epithelium or the lamina propria of the middle and lower parts of the isolated sac. The most conspicuous feature of the villi at the upper end of the sac was the vacuolation of the apical cytoplasm of the enterocytes. The damage caused by PEG infusion disappeared 6 hr after the replacement of PEG by an infusion of isosmotic glucose solution. It is concluded that this method has potential as a model for the controlled investigation of the mechanism of intestinal epithelial damage in the experimental animal.

3069 THE FAILURE OF SUPPLEMENTAL DIETARY COPPER TO PREVENT CUPRIZONE-INDUCED ALTERATIONS IN MOUSE HEPATOCYTES. (Eng.) Tandler, B.; Hoppel, C. L. (Sch. Dentistry, Case Western Reserve Univ., Cleveland, OH). *Beitr. Pathol.* 156(1):56-64; 1975.

3070 INNERVATION OF THE LARGE INTESTINE IN DOGS. (Eng.) Chaudhary, S. C. (Dept. Medicine, Univ. Nairobi, Kenya). *East. Afr. Med. J.* 52(1): 52-55; 1975.

3071 ON THE OCCURRENCE OF ARGYROPHIL CELLS IN SALIVARY GLANDS. (Eng.) Carlsoo, B.; Ostberg, Y. (Dept. Histology, Pathology, and Otolaryngology, Univ. Umea, S-90187, Umea, Sweden). *Cell Tissue, Res.* 167(3):341-350; 1976.

3072 HUMAN LIVER CORTICOSTERONE RECEPTORS. (Eng.) Agarwal, M. K. (I.N.S.E.R.M. U. 36, 17, rue du Fer a Moulin, 75005 Paris, France). *Biomedicine* 25(2):73-74; 1976.

3073 DYNAMIC MORPHOLOGY OF THE DISTAL END OF THE COMMON BILE DUCT. (Eng.) Fernandez-Cruz, L.; Pujol-Soler, R.; Pera, C. (Facultad de Medicina, Universidad de Barcelona, Spain). *Chir. Gastroenterol.* 9(3):379-384; 1975.

3074 A RADIOLOGICAL STUDY OF MORPHOLOGY AND GROWTH IN THE HUMAN FETAL COLON. (Eng.) Harris, P. F.; Jones, P. R. M.; Robertson, C. S. (Dept. Anatomy, Univ. Manchester, Manchester M13 9PT, England). *Br. J. Radiol.* 49(580):316-320; 1975.

3075 THE PANETH CELL POPULATION OF THE SMALL INTESTINE OF THE RAT--EFFECTS OF FASTING AND ZINC DEFICIENCY ON TOTAL COUNT AND ON DITHIOZONE-REACTIVE COUNT. (Eng.) Elmes, M. E. (Dept. Medicine, Queens Univ. Belfast, Grosvenor Road, Belfast BT12 6BJ, North Ireland). *Pathology* 118(3):183-191; 1976.

3076 FINE STRUCTURES OF NORMAL GASTRIC GLANDS IN SEVERAL ANIMALS. (Jpn.) Shibasaki, S. (Univ. Sch. Medicine, Maebashi, Japan). *Nihon Rynsho Denshi Kenbikyo Gakkai-Shi* 7(1):103-117; 1974.

See also, 3128, 3218, 3226, 3343, 3344, 3542, 3614.

ABSORPTION - EXCRETION - TRANSPORT

3077 ABSORPTION OF GALACTOSE BY THE RAT SMALL INTESTINE IN VIVO: PROXIMAL-DISTAL KINETIC GRADIENTS AND A NEW METHOD TO EXPRESS ABSORPTION PER ENTEROCYTE. (Eng.) Batt, R. M.; Peters, T. J. (Royal Postgraduate Medical Sch., Du Cane Rd., London, W12 OHS, England). *Clin. Sci. Mol. Med.* 50(6):499-509; 1976.

The *in vivo* absorption of D-galactose by the small intestine was investigated in proximal jejunum and distal ileum in male Wistar rats by use of a recirculation perfusion technique. Multiple sequential perfusions of 64 mmol/l galactose over 4 hr produced no functional or morphological damage in the perfused segments. Absorption of galactose from 8 and 64 mmol/l solutions was independent of flow rate over the range 1.0-6.5 ml/min. Galactose absorption in both the jejunum and the ileum exhibited saturation kinetics of the Michaelis-Menten type. The V_{max} was significantly different ($p<0.001$) for the jejunum and the ileum, although the difference in K_m was not significant ($p=0.07$). The addition of phlorrhizin at concentrations ranging from 10^{-5} to 10^{-2} mol/l, following 64 mmol/l galactose, resulted in a progressive decrease in galactose absorption, until absorption was inhibited by 95% in the jejunum at the highest concentration. Sorbose (64 mmol/l) was absorbed only minimally or not at all in both the jejunum and ileum. Enterocytes were isolated from perfused segments and were quantified by DNA assay with a correction for yield, and the absorptive capacity per enterocyte was calculated. The maximum absorptive capacity per enterocyte was 3.5 times greater in the jejunum than in the ileum. The results agree with previous studies, which assayed the total DNA/cm in intestinal homogenates and determined the proportion of intestinal cells that were mature enterocytes from histological sections.

3078 EVIDENCE FOR TWO DIFFERENT MODES OF TRIPEPTIDE DISAPPEARANCE IN HUMAN INTESTINE: UPTAKE BY PEPTIDE CARRIER SYSTEMS AND HYDROLYSIS BY PEPTIDE HYDROLASES.

(Eng.) Adibi, S. A.; Morse, E. L.; Masilamani, S. S.; Amin, P. M. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15213). *J. Clin. Invest.* 56(6):1355-1363; 1975.

The intestinal fate of triglycine and trileucine was investigated by jejunal perfusion in healthy subjects. Rates of glycine or leucine uptake from test solutions containing triglycine or trileucine were greater than from test solutions containing corresponding amounts of free glycine or free leucine. The rate of glycine uptake from a 100 mM triglycine solution was greater than that from a 150 mM diglycine solution. At each infused load of triglycine (1,000 µmol/min), the rates of either triglycine disappearance (810 ± 40 µM/min/30 cm) or glycine absorption (2,208 ± 122 µM/min/30 cm) were markedly greater than the luminal accumulation rates of either diglycine (56 ± 10 µM/min/30 cm) or free glycine (110 ± 18 µM/min/30 cm). The luminal accumulation rate of free leucine during infusion of a 5 mM trileucine solution was over threefold greater than that of free glycine during the infusion of a 5 mM triglycine solution. Luminal fluid exhibited no hydrolytic activity against triglycine, but contained some activity against trileucine. Saturation of free amino acid carrier system with a large load of leucine (100 mM) did not affect glycine absorption rate from a triglycine test solution, but isoleucine markedly inhibited the uptake of leucine from a trileucine solution. When the carrier system for dipeptides was saturated with 100 mM glycylleucine, the disappearance rate of triglycine was reduced by 66%, while that of trileucine remained unaffected. After addition of glycylleucine to tripeptide solutions, there was a minimal increase in the luminal accumulation of diglycine, while dileucine accumulation was increased by 62-fold. It is concluded that triglycine is taken up intact by human jejunum. This uptake is mediated totally or partially by the carrier system, which also transports dipeptides. In contrast, trileucine is hydrolyzed to leucine and dileucine mostly on the cell surface and a small fraction is hydrolyzed in the gut lumen. These hydrolytic products are then taken up by the free amino acid and dipeptide carrier systems, resp.

3079 VITAMIN D-DEPENDENT, PARTICULATE CALCIUM BINDING ACTIVITY AND INTESTINAL CALCIUM TRANSPORT.

(Eng.) Kowarski, S.; Schachter, D. (Columbia Univ. Coll. Physicians and Surgeons, New York, NY 10032). *Am. J. Physiol.* 229(5):1198-1204; 1975.

The identification and preliminary biochemical characterization of a new vitamin D-dependent, calcium binding complex (CaBC) of mucosa are described in albino male Sherman rats. The Ca binding activity was sedimented at 140,000 x *g* after treatment of the mucosal particulate fraction with Triton X-114. The Ca binding component was inactivated by heat and repeated freeze thawing and consisted of one or more protein complexes in the range of 0.5-1.0 million mol weight, as indicated by gel filtration. Vitamin D (20,000 IU, s.c. injection) increased the CaBC activity of the duodenal mucosa of deficient rats from 125 ± 16 counts/min/µg to 215 ± 35 ($p<0.002$). Vitamin D also increased the calcium binding protein (CaBP) activity of the duodenal ($p<0.001$) and jejunal ($p<0.001$) mucosa. Maintenance on a diet deficient in Ca strongly stimulated the intestinal Ca-transport mechanism and increased the CaBP in the rat. The mean Ca binding values observed with CaBC preparations from low (0.02%) and high (1.20%) Ca groups, were 75.2 and 54.0 counts/min/µg, resp. ($p<0.01$). The CaBC activity of the duodenal mucosa from young rats significantly exceeded that of the older animals ($p<0.002$). In contrast, the particulate Ca ATPase activity of rat duodenal mucosa did not decrease with age. Duodenal CaBC activity was decreased by cycloheximide from the control values ($p<0.002$). Simultaneously, duodenal CaBP activity was also reduced ($p<0.05$). It is suggested that the component might function in the transit of Ca across the brush border surface to the cytosol of intestinal mucosal cells.

3080 INTESTINAL PERMEABILITY TO LARGE PARTICLES IN NORMAL AND PROTEIN-DEFICIENT ADULT RATS.

(Eng.) Worthington, B. S.; Syrotuck, J. (Child Development and Mental Retardation Center, Univ. Washington, Seattle, WA 98195). *J. Nutr.* 106(1):20-32; 1976.

Intestinal absorption of ferritin and virus particles was assessed in control and protein-deficient rats using light and electron microscopy. Male Sprague-Dawley rats weighing 100-130 g were fed either a 0.5% or 18% lactalbumin diet. At monthly intervals following diet initiation, three rats from each of the two groups received ferritin (molecular weight=650,000, 10 mg/100 ml) or adenovirus type 5 (molecular weight>1,000,000) via ligated jejunal loops either 15 or 30 min prior to loop excision and processing for electron microscopy. Morphological evaluation of jejunal tissues revealed that both control and protein-deficient rats absorbed ferritin and virus particles via pinocytosis, and in both situations, the exogenous particles were believed to be present in lysosomal bodies of typical absorptive cells. Neither ferritin molecules nor virus particles were identified elsewhere in the jejunal mucosa of control rats. However, rats, which were deprived of sufficient dietary protein for 4 months or longer demonstrated exogenous tracer materials in intracellular spaces of the epithelium and lamina propria. Since these severely protein-deprived rats also demonstrated deterioration of apical intercellular junctions, it is possible that large particles moved directly between cells of the epithelial lining and subsequently into underlying connective tissue and vascular compartments for conveyance (as antigens) to other body regions.

3081 STUDIES ON INTRACELLULAR TRANSPORT OF SECRETORY PROTEINS IN THE RAT EXOCRINE PANCREAS. IV. STIMULATION BY IN VIVO INFUSION OF CAERULEIN. (Eng.) Bieger, W.; Martin-Achard, A.; Bassler, M.; Kern, H. F. (Dept. Anatomy, D-6900 Heidelberg, Im Neuenheimer Feld 307, W. Germany). *Cell Tissue Res.* 165(4):435-453; 1976.

The effects of prolonged secretory stimulation of the exocrine pancreas by *in vivo* infusion (2 ml/hr) of cerulein (5 x 10^{-8} g/hr) were investigated in male Wistar rats. During the first 6-12 hr of stimulation, Golgi complexes were enlarged and several structural forms of multivesicular bodies were found, indicating a lysosomal degradation of membrane material in the Golgi area. Maximum secretory activity was obtained after a 24-hr infusion; Golgi complexes appeared fragmented and the secretory granules measured only 1/3-1/4 of their normal. In spite of continuous stimulation, the exocrine cells regranulated progressively up to 72 hr infusion. Pancreatic protein synthesis, as measured by the incorporation of tritiated leucine, remained unchanged during the first 6 hr of stimulation, then increased reaching a maximum of 230% of the control levels after 24 hr infusion. After 48 and 72 hr, the rate of protein synthesis decreased again to normal values. Most pronounced changes were observed in the kinetics of intracellular transport of newly synthesized proteins. Using pulse-chase incubation of prestimulated pancreatic lobules, the rate of transition of secretory proteins through the cell increased consistently with prolonged infusion periods reaching maximal acceleration after 24 hr. Newly synthesized proteins were transported and segregated up to 10 times faster than in controls. Enzyme secretion, measured for amylase, followed a similar pattern of stimulation. The results suggest a phasic adaptation of the exocrine pancreatic cell to prolonged stimulation. They demonstrate the possibility of an acceleration of intracellular transport by means of secretagogues.

3082 ACTION OF AMILORIDE ON ELECTROLYTE TRANSPORT OF THE RAT COLON, AND ITS DEPENDENCE ON MINERALOCORTICOIDS. (Ger.) Lange, S.; Veit, C.; Hegel, U.; Gutsche, U. (Klinikum Steglitz, 1 Berlin (West) 45, Hindenburgdamm 30, West Germany). *Endokrinologie* 63(2):271-278; 1974.

An electrolyte solution was instilled into closed segments of the colon descendens and withdrawn 1 hr later to study salt and water transport by the colon of Wistar rats. Control rats absorbed sodium, chloride, and water, and they secreted potassium; amiloride (1 mg/ml) induced the secretion of sodium, chloride, and water. In adrenalectomized rats, colonic transport rates were reduced, and could not be altered by amiloride. The substitution of aldosterone, but not of dexamethasone, enhanced transport rates and restored the reaction of the colonic mucosa to amiloride. These findings may contribute to the understanding of the mechanism of action of amiloride and of mineralocorticoids.

3083 LIPID TRANSPORT ACROSS THE INTESTINAL EPITHELIAL CELL: EFFECT OF COLCHICINE. (Eng.) Arreaza-Plaza, C. A.; Bosch, V.; Otayek, M. A. (Catedra de Patologia General y Fisiopatologia, Facultad de Medicina, Apdo. 50587, Sabana Grande, Venezuela). *Biochim. Biophys. Acta* 431(2):297-302; 1976.

The effect of colchicine on lipid transport across the intestinal epithelial cell was investigated in female Sprague-Dawley rats, which were administered 1 g of emulsified margarine 1 hr after administration of 0.5 mg/100g colchicine. In contrast with control animals, the rats administered colchicine did not show a rise in plasma triacylglycerol concentration. Treatment with 0.5 ml of 20% Triton WR-1339 solution, 2 hours prior to decapitation, produced a marked increase in plasma triacylglycerol concentration in the fasting rat. When Triton WR-1339 was given in conjunction with margarine, the elevation of triacylglycerol concentration in plasma reached higher values than when Triton WR-1339 was given alone ($p<0.001$). Pretreatment with colchicine blocked the margarine-induced rise in triacylglycerol concentration in the presence of Triton WR-1339. The content of triacylglycerol was measured in a jejunal segment after margarine and colchicine treatment. A fivefold increase occurred in the six rats treated with colchicine (20.2 mg/g wet weight, $p<0.001$) as compared with controls. These results are consistent with the idea that colchicine interferes with the intracellular phase of fat absorption, suggesting that the microtubular microfilamentous system may be involved in the release of chylomicrons from the intestinal cell into the circulation.

3084 ACTIVE TRANSPORT IN THE CANINE SMALL INTESTINE FOLLOWING AN ACUTE OCCLUSION. (Fre.) Robinson, J. W. L.; Mirkovitch, V.; Cobo, F.; Menge, H.; Vouron, J. (Hopital Cantonal, CH-1011 Lausanne, Switzerland). *Helv. Chir. Acta* 42(1/2): 123-125; 1975.

3085 REPORT ON STUDIES ON THE RESORPTION OF SUGAR FOR THE REPORT YEARS 1973/1974 AND 1974/1975 (INTERIM REPORT). (Ger.) Clodi, P. H. (Zuckerforschungs-Institut, Austria). *Jahresbericht 1974/75 (Austria)* 9:150-155; 1975.

3086 SIGNIFICANCE OF CARBOHYDRATES IN THE AMINO ACIDS UPTAKE IN THE DIGESTIVE TRACT (INTERIM REPORT). (Ger.) Hagmuller, K. (Zuckerforschungs-Institut, Austria). *Jahresbericht 1974/75 (Austria)* 9:156-157; 1975.

See also, 3432, 3472.

3087 GASTRO-OESOPHAGEAL ACID REFLUX AND SPHINCTER PRESSURE IN NORMAL HUMAN SUBJECTS. (Eng.)

Boesby, S. (Odense Univ. Hosp., DK-5000 Odense, Denmark). *Scand. J. Gastroenterol.* 10(7):731-736; 1975.

Twelve-hour continuous recording of pH at the distal end of the esophagus and manometric study of the basal gastro-esophageal sphincter pressure were carried out in 26 normal subjects. Eighteen of the 26 had 1-33 reflux episodes. The duration of each episode was shorter than 15 min in 16 of these 18 subjects. One single reflux episode lasting 15-30 min occurred in two, and one lasting 30-45 min was recorded in one. The total duration of low pH was expressed in percentages of the total time of recording and was dependent upon the criteria used for low pH. On automatic analysis of the course of investigation, pH below 2.3 was found in 5, pH below 3 in 17, and pH below 4 and 5 in 18 of the 26 subjects. Basal gastro-esophageal sphincter pressure fluctuated between 8 and 24 mm Hg. The results suggest that in healthy, asymptomatic individuals, the gastro-esophageal barrier against reflux may be periodically incompetent. If contact between acid gastric contents and the esophageal mucosa is a factor provoking heartburn, low esophageal pH need not necessarily give rise to symptoms; the sensibility to low pH is either individual, or patients with symptoms have considerably more frequent and longer lasting episodes of reflux with low esophageal pH than do normal subjects.

3088 PRESSURE MEASUREMENT IN THE TERMINAL ESOPHAGUS IN HEALTHY BABIES AND INFANTS AGED 3 WEEKS TO 20 MONTHS. (Ger.)

Oesch, A. (Inselspital, Bern, Switzerland). *Helv. Paediatr. Acta* 29(3):251-260; 1974.

Intraluminal pressure in the lower esophagus was measured in 33 infants without esophageal dysfunction, using the open-tip-tube method. In 3-week-old infants, a high pressure profile was found in the area of the gastroesophageal sphincter. The average length of this high pressure profile (9-15 mm) and the average pressure (5-8 mm Hg above that of the fundic portion of the stomach) did not change up to the age of 20 months. These results correspond closely to those found in adults. Both the reflectory relaxation of the gastroesophageal sphincter and the contraction following it found in 24 infants were analogous to those found in adults.

3089 FURTHER STUDIES OF THE ACTION OF CYCLIC AMP ON THE ELECTRICAL AND MECHANICAL ACTIVITIES OF INTESTINAL SMOOTH MUSCLE. (Eng.)

Ohkawa, H. (Yamaguchi Univ. Sch. Medicine, Ube 755, Japan). *Jpn. J. Pharmacol.* 26(2):201-207; 1976.

The effects of externally applied cyclic AMP and other adrenergic stimulants on the electrical and mechanical activities of the cat small intestine were observed by using pressure electrodes. The electrical and mechanical activities were suppressed by 10^{-5} g/ml cyclic AMP and beta stimulants such as 10^{-6} g/ml adrenalin, 10^{-6} g/ml noradrenalin, and 10^{-6} g/ml isopreterenol. The inhibitory actions of cyclic AMP and beta stimulants were potentiated after treatment with 10^{-3} g/ml caffeine, 10^{-4} g/ml theophylline, and 10^{-5} g/ml papaverine, which inhibited the phosphodiesterase activity. The inhibitory action of cyclic AMP and beta stimulants was decreased by 10^{-5} imidazole, an agent that increased phosphodiesterase activity. Exogenously applied concanavalin A, 10^{-7}-10^{-4} g/ml, an agent that inhibits the adenyl cyclase activity, showed no observable changes in both activities, but the effects of beta stimulants were decreased after treatment with concanavalin A. No obvious changes were obtained with cyclic GMP and 10^{-6}-10^{-4} dibutyryl cyclic GMP. These findings tentatively support the hypothesis that cyclic AMP is a second messenger in the inhibitory responses to beta stimulants on the intestinal smooth muscle. It is also concluded that the inhibition of mechanical activity, caused by cyclic AMP, is partially due to suppression of the membrane activity.

3090 RESPONSES TO FIELD STIMULATION OF THE SMOOTH MUSCLE CELL MEMBRANE OF THE GUINEA PIG STOMACH. (Eng.)

Ito, Y.; Kuriyama, H. (Faculty Dentistry, Kyushu Univ., Fukuoka 812, Japan). *Jpn. J. Physiol.* 25(3):333-344; 1975.

The responses of smooth muscle cell membrane of the guinea pig stomach to field stimulation was investigated. In response to a single field stimulation (0.1-0.2 msec), the longitudinal and circular muscles excised from the antrum of the stomach produced a small hyperpolarization that was blocked by treatment with tetrodotoxin (5 x 10^{-7} g/ml). Repetitive stimulation at various frequencies lowered the amplitude of the slow potential change, thus causing suppression of the spike generation and mechanical response. Phentolamine (10^{-7} g/ml) did not suppress the generation of the inhibitory junction potential produced by a single stimulation but it did suppress slightly the hyperpolarization produced by repetitive stimulation. Tetrodotoxin suppressed the amplitude but not the frequency of the slow potential change; however, repetitive field stimulation in the presence of tetrodotoxin did not reduce further the amplitude of the slow potential changes. After a single or repetitive field stimulation was applied, the muscle membrane produced a delayed excitation on the slow potential change. The delayed excitation did not generate in the presence of tetrodotoxin or of atropine (10^{-6} g/ml). Reversal potential level for the inhibitory junction potential was ranged between -80 and -85 mV. Externally applied noradrenalin and ATP suppressed the generation of slow potential changes. Noradrenalin slightly hyperpolarized the membrane and increased the ionic conductance of the membrane, but ATP neither modified the membrane potential nor increased the ionic conductance of the membrane. Although both ATP and noradrenalin are chemical transmitters, the responses observed when these agents were applied externally may not be an accurate representation of those observed in nerve stimulation because of topical differences in the innervation and multiple actions of these chemicals.

3091 STIMULATION OF INTESTINAL SMOOTH MUSCLE BY ATROPINE, PROCAINE, AND TETRODOTOXIN.

(Eng.) Bortoff, A.; Muller, R. (Upstate Medical Center, Syracuse, NY 13210). *Am. J. Physiol.* 229(6):1609-1613; 1975.

The effects of atropine, procaine, and tetrodotoxin (TTX) on the mechanical and electrical activities of several types of cat intestinal smooth muscle preparations were examined. The preparations consisted of isolated rings of intact intestinal wall, intact longitudinal and circular muscle, ganglion-free circular muscle, and ganglion-free circular muscle devoid of its dense layer and plexus muscularis profundus. Atropine and procaine (> 10^{-4} M) stimulated all four types of preparation. At the same dose of atropine, the response of stripped circular muscle was greater than that of intact circular muscle in three out of four and four out of four preparations, resp. On the other hand, TTX (up to 5 x 10^{-6} M) stimulated only the first two preparations. It is concluded that whereas atropine and procaine can directly stimulate intestinal smooth muscle, the excitatory effect of TTX is neurally mediated.

3092 QUANTITATIVE STUDIES OF THE EFFECT OF PANCREATIC GLUCAGON^{+} AND SECRETIN^{++} ON GASTROINTESTINAL MOTILITY IN MAN RECORDED BY SIMULTANEOUS ELECTRO-MANOMETRIC REGISTRATION.

(Ger.) Paul, F. (Med. Hochschule, D-3000 Hannover-Kleefeld, Karl-Wiechert-Allee 9, West Germany). *Klin. Wochenschr.* 52(20):983-989; 1974.

The effect of crystalline pancreatic glucagon and secretin on the motility of the gastrointestinal tract was investigated in 47 subjects without organic gastrointestinal disorders. Simultaneous electromanometric recordings were registered with the aid of microballoons. Secretin (2 Crick-Harper-Raper-U/kg/30 min, i.v.) caused a significant inhibition of the motility phenomena of stomach and duodenum; colonic motility was not influenced. Pancreatic glucagon (0.2 mg/30 min, i.v.) induced an intense suppression of the motility of stomach, proximal small bowel, and colon. It is concluded that in spite of their great structural similarities, both hormones have different sites of action on human gastrointestinal motility. Since pancreatic glucagon inhibits the motility of the proximal and, in contrast to secretin, of the distal gastrointestinal tract as well, it is suggested that this hormone may be used in the treatment of spastic pains originating from the gastrointestinal tract.

3093 THE MOTOR-STIMULATING EFFECT OF NATURAL MOTILIN ON THE LOWER ESOPHAGEAL SPHINCTER, FUNDUS, ANTRUM AHD DUODENUM IN DOGS.

(Eng.) Jennewein, H. M.; Hummelt, H.; Siewert, R.; Waldeck, F. (Abteilung Forschung, C. H. Boehringer Sohn, D-6507 Ingelheim, W. Germany). *Digestion* 13(4):246-250; 1975.

The effect of natural motilin on gastrointestinal motor activity was studied in 10 anesthetized dogs. In single i.v. doses of 10, 30, 100, and 300 ng/kg, and as a continuous infusion (100 ng/kg/hr, 30 min), motilin induced phasic pressure changes in the lower esophageal sphincter (LES) and in the lumen of the fundus, antrum, and duodenum. Tachyphylaxis was seen in six of the dogs. Motilin had no effect on isolated muscle strip preparations of the LES, fundus, antrum, and duodenum in this species, but it is effective on isolated muscle strips from the duodenum and antrum of rabbits and humans. Although the dosages of motilin used were very low (both the single injection and the i.v. infusion), the blood level and motilin effects during endogenous release and exogenous administration should be compared to prove the physiologic activity of motilin.

3094 ACTIONS OF RICINOLEIC ACID AND STRUCTURALLY RELATED FATTY ACIDS ON THE GASTROINTESTINAL TRACT. I. EFFECTS ON SMOOTH MUSCLE CONTRACTILITY IN VITRO.

(Eng.) Stewart, J. J.; Gaginella, T. S.; Bass, P. (Center Health Sciences, Univ. Wisconsin, 425 North Charter St., Madison, WI 53706). *J. Pharmacol. Exp. Ther.* 195(2):347-354; 1975.

Ricinoleic acid and several structurally related compounds were tested for their effects on the smooth muscle contractions of the coaxially stimulated guinea pig ileum, the spontaneously contracting rabbit jejunum, 90 mM potassium depolarized guinea-pig taenia coli, and rat colon. Ricinoleate (1.25 x 10^{-5} to 4 x 10^{-4} M), produced a dose-dependent depression of the stimulated guinea pig ileum. This action was not produced by matching concentrations of oleate, elaidate, linoleate, 12-hydroxystearic acid, 10(9)-hydroxystearate, the methyl ester of ricinoleic acid, or the *trans* isomer, ricinelaidate. Ricinoleyl alcohol was active and, although the depression produced by it took longer to maximize, the dose-response curves for ricinoleate and ricinoleyl alcohol on this tissue were almost superimposable. Ricinoleate showed the same qualitative and quantitative effects on the spontaneously contracting rabbit jejunum, but several differences were noted on the depolarized preparations. Ricinoleate-induced depression of depolarized smooth muscle was much slower in onset and required about 10 times higher concentrations to achieve equivalent responses. The results indicate that ricinoleic acid is not a stimulant or irritant to isolated intestinal smooth muscle.

3095 INHIBITION OF PERISTALSIS IN GUINEA-PIG ISOLATED ILEUM AND COLON BY DRUGS THAT BLOCK PROSTAGLANDIN SYNTHESIS.

(Eng.) Bennett, A.; Eley, K. G.; Stockley, H. L. (King's Coll. Hosp. Medical Sch., London SE5 8RX, England). *Br. J. Pharmacol.* 57(3):335-340; 1976.

Methods of analyzing peristaltic activity were evaluated by use of recordings of longitudinal and circular muscle activity and of propulsion in whole segments of guinea pig ileum and colon. Some prostaglandin synthesis inhibitors and antagonists of prostaglandin action were tested for their suitability for studying the role of prostaglandins in peristalsis. Aspirin (100-200 μg/ml) had no significant effect on submaximal contractions caused by acetylcholine perchlorate (ACh, 4-10 ng/ml), histamine (10 ng/ml), nicotine (1-20 μg/ml), or prostaglandin E_2 (25-300 ng/ml). Indomethacin (1-4 μg/ml) reduced responses to nicotine and prostaglandin E_2. Polyphloretin phosphate (PPP, 40-100 μg/ml) reduced contractions of the longitudinal muscle of guinea pig ileum induced by nicotine (1-20 μg/ml) or prostaglandin E_2 (2-200 ng/ml) but had little effect on responses to ACh (10-100 ng/ml). Aspirin (20-100 μg/ml) or indomethacin (1-4 μg/ml), applied serosally, greatly inhibited all aspects of peristalsis in guinea pig ileum and colon. Inhibition of peristalsis of the ileum by aspirin was antagonized by prostaglandin E_2 (0.1-0.5 μg/ml) and that by indomethacin was removed by prostaglandin $F_{2\alpha}$ (0.3-0.5 μg/ml) or ACh (90.3-1 μg/ml). Inhibition of colonic peristalsis by aspirin (50-100 μg/ml) was antagonized by prostaglandin E_2 but rarely by ACh, and that by indomethacin (0.5-1 μg) was antagonized by prostaglandin E_1 or E_2. Mucosal application of aspirin had little effect on either ileum or colon but indomethacin caused some inhibition. These results support the supposition that prostaglandins contribute to peristaltic activity.

3096 EFFECTS OF AMBIENT AND STAGNANT HYPOXIA ON THE MECHANICAL AND ELECTRICAL ACTIVITY OF THE CANINE UPPER JEJUNUM. (Eng.) Meissner, A.; Bowes, K. L,; Sarna, S. K. (Inst. Hematology, 00957 Warsaw, Poland, Chocimska nr. 5). *Can. J. Surg.* 19(4):316-321; 1976.

The effects of ambient and stagnant hypoxia on the mechanical and electrical activity of the upper jejunum were studied in 32 anesthetized dogs. A 50% or 75% reduction in oxygen content of inhaled air produced ambient hypoxia; superior mesenteric artery (SMA) occlusion or thrombin-induced (150 NIH U/kg) mesenteric thrombosis resulted in stagnant hypoxia. Induction of hypoxia was immediately followed by a transient increase in mechanical activity. A 50% reduction in oxygen content had no other effect. A 75% reduction in oxygen content resulted in a gradual decrease in electrical control activity (ECA) frequency, in the disappearance of electrical response activity (ERA), and in jejunal contractions; however, ECA persisted until cardiac arrest occurred after 30-45 min of hypoxia. Occlusion of the SMA resulted in a significant decrease in contractile activity, but ECA was not affected. Thrombin-induced mesenteric thrombosis produced rapid and irreversible disappearance of both electrical and mechanical activities. Jejunal contractions and ERA are dependent upon an adequate oxygenated blood supply. ECA however, is highly resistant to reduction in oxygen content of perfused blood and it continues until perfusion stops.

3097 NEW ARTIFICAL INTESTINAL SPHINCTER: EXPERIMENTAL STUDY ON DOGS. (Ger.) Schauwecker, H. H.; Geroulanos, S.; Hahnloser, P.; Sauberli, H.; Kock, N. G. (Chirurgische Klinik A, Kantonsspital, Raemistrasse 100, CH-8006 Zurich, Switzerland). *Helv. Chir. Acta* 42(1/2):103-106; 1975.

3098 METHOD OF COMBINED STUDIES OF MEDIUM pH AND MOTOR ACTIVITY OF THE SMALL INTESTINE. (Rus.) Zlatkina, A. R.; Gal'perin, Iu. M.; Bezzubik, K. V.; Eskin, V. Ia.; Matafonova, L. F.; Novoselets, A. S. (M. F. Vladimirskii Moscow Regional Scientific Res. and Clinical Inst., Moscow, USSR). *Ter. Arkh.* 47(12):65-69; 1975.

3099 INFLUENCE OF DIFFERENT DOSES OF SYMPATHOLYTIC IZOBARIN ON THE EVACUATING FUNCTION OF STOMACH. (Ukr.) Begeka, A. D.; Groisman, S. D. (Inst. Physiology, Kiev Univ., Kiev, USSR). *Fiziol. Zh.* 21(5):649-653; 1975.

3100 THE EFFECT OF METOCLOPRAMIDE, PYRIDOSTIGMINE BROMIDE AND CHOLECYSTOKININ ON DUODENAL MOTILITY [Abstract]. (Eng.) Oigaard, A.; Fleckenstein, P. (Rigshospitalet, Blegdamsvej 9, Copenhagen, DK-2100, Denmark). *Scand. J. Gastroenterol.* 10(35):30; 1975.

3101 QUANTITATIVE MOTILITY STUDIES: PROBLEMS OF RECORDING AND ANALYSIS [Abstract]. (Eng.) Oigaard, A. (Rigshospitalet, Blegdamsvej 9, Copenhagen, DK-2100, Denmark). *Scand. J. Gastroenterol.* 10(35):26; 1975.

3102 THE EFFECT OF METOCLOPRAMIDE ON THE MOTOR FUNCTION OF THE ESOPHAGUS AND ON THE CARDIAC SPHINCTER. (Rus.) Krasil'shchikov, K. B.; Groisman, S. D. (Res. Inst. Physiology, T. G. Shevchenko Kiev Univ., Kiev, USSR). *Biull. Eksp. Biol. Med.* 80(9):53-56; 1975.

SECRETION AND METABOLISM

3103 HISTAMINE-INDUCED HYPOCALCEMIA IN THE RAT. (Eng.) Norberg, H. P.; Schulak, J. A.; Atlas, B.; Kaplan, E. L. (Pritzker Sch. Medicine, Univ. Chicago, Chicago, IL 60636). *Metabolism* 25(2):131-134; 1976.

The effect of histamine and betazole hydrochloride (Histalog) on serum calcium homeostasis was studied in male Holtzman rats. Either histamine base, histamine phosphate, betazole, or the appropriate control solution was injected i.v. into fasted, anesthetized 80-100 g rats. Venous blood was collected before and at 30 and 60 min postinjection. Histamine base (0.5-2.0 mg/rat) induced a significant hypocalcemic response 30 min postinjection; it returned to baseline by 60 min. Likewise, the administration of 1.375 mg/rat of histamine phosphate (equivalent to 0.5 mg histamine base) also resulted in a significant fall in serum calcium concentration. However, betazole administration, in doses as high as 10 mg/rat, did not lower the serum calcium concentration. In the histamine experiments, neither total protein nor hematocrit values differed from control at the time of hypocalcemia. Therefore, the changes in serum calcium concentration cannot be explained by hemodilution. These experiments demonstrate that in the rat the administration of histamine results in a hypocalcemic response similar to that previously observed with gastrin.

3104 EXAMINATION OF BLOOD CAPILLARIES OF THE RAT PAROTID GLAND DURING THREE-HOUR SECRETORY CYCLE. (Rus.) Gusev, S. A. (N. I. Pirogov Second Medical Inst., Moscow, USSR). *Biull. Eksp. Biol. Med.* 80(7):104-106; 1975.

3105 DOPAMINE-INDUCED AMYLASE SECRETION FROM GUINEA-PIG SUBMANDIBULAR GLAND. (Eng.) Bloom, G. D.; Carlsoo, B.; Danielsson, A. (Dept. Histology, Univ. Umea, S-901 87 Umea, Sweden). *Br. J. Pharmacol.* 54(4):523-528; 1975.

See also, 3116, 3345.

SECRETION AND METABOLISM

Stomach

3106 MAST CELLS AND GASTRIC SECRETION IN THE RAT. (Eng.) Heap, B. J.; Kiernan, J. A. (Dept. Anatomy, Cambridge Univ., Cambridge, England). *Q. J. Exp. Physiol.* 60(4):307-313; 1975.

The relation between mast cells and gastric secretion was investigated in adult female albino Wistar rats deprived of solid food for 48 hr. In control animals, values were obtained for the residual content of acid in the stomach, indicative of the rate of basal secretion, and for the quantities of acid secreted 30 min following injections of 5.0 mg/kg histamine hydrochloride, 250 μg/kg pentagastrin, 100 IU/kg soluble insulin, and 200 μg compound 48/80. The same measurements were determined in groups of rats treated for 5 days with 100-500 μg compound 48/80 (which selectively depleted the whole body of mast cells), and for 3 days with 0.1 mg dexamethasone sodium phosphate (which selectively depleted the gastric mucosa of mast cells). The content of residual acid was depressed to one third of the control value in the 48/80 treated rats, but the additional secretion due to histamine, pentagastrin, or insulin was unaffected. A secretory response to a single injection of compound 48/80 could not be obtained in rats depleted of mast cells. In the dexamethasone treated rats, the residual level of acid was increased to 1.5 times the control value, but the magnitudes of the responses to secretogogues were unchanged. It is concluded that basal secretion of acid into the stomach of the rat is stimulated by histamine derived from mast cells throughout the body, those of the gastric mucosa having no special significance in this respect.

3107 THE INTESTINAL PHASE OF GASTRIC SECRETION: RESPONSE TO LIVER EXTRACT INFUSION INTO THE PROXIMAL JEJUNUM OF HEALTHY HUMAN SUBJECTS. (Eng.) Grabner, P.; Semb, L. S.; Schrumpf, E.; Myren, J. (Diakonhjemmets Hosp., Boks 23, Vinderen, Oslo, Norway). *Scand. J. Gastroenterol.* 11(4):415-419; 1976.

Studies were undertaken to determine whether: (a) gastric secretion increases during perfusion of the proximal jejunum with various substances known to stimulate gastric secretion in animals, (b) perfusion of the proximal jejunum induces changes in serum gastrin level, and (c) interactions occur between endogenous and exogenous gastrin stimulation with jejunal perfusion. A Levine tube was placed under radiological control in the stomach, and a thin polyethylene tube was placed in the proximal jejunum of six healthy volunteers. The stomach and proximal part of jejunum were perfused for 2 hr with 1% acetylcholine, 20% meat extract (Bovril), and 200 ml of 15% liver extract (LE), both alone and in combination with simultaneous infusion of 0.1 μg or 3 μg of exogenous i.v.-administered pentagastrin. A significant increase in serum gastrin concentration was found with antral perfusion of LE only, whereas perfusion of the proximal jejunum did not change the basal level of the serum gastrin concentration. No change from control values was observed in gastric acid and pepsin output on perfusing proximal jejunum with LE alone, or in combination with pentagastrin. Reflux to the stomach varied between 0-1.4%, as determined by addition of radioactive B_{12} to the perfusates. Gastrin was released from the antrum of the stomach by perfusion with 15% LE, but not from the jejunum under the present experimental conditions. Bovril and acetylcholine perfusions did not cause significant responses from the antrum or from the proximal jejunum. The lack of gastric acid response to perfusion of the proximal jejunum in these experiments suggests that the intestinal phase of gastric secretion in man may be different from that observed in other animals.

3108 BIOLOGICAL ACTIVITY OF IODINATED GASTRINS.

(Eng.) Dockray, G. J.; Walsh, J. H.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *Biochem. Biophys. Res. Commun.* 69(2):339-345; 1976.

The biological activity of mono- and di-iodo gastrin on acid secretion was studied in two dogs with gastric fistulae. The gastrins were prepared by a minor modification of the chloramine-T reaction and were purified by ion-exchange chromatography. When gastrin was iodinated with ^{125}I, two iodinated products had specific activities of 2,200 and 4,700 cpm/fmol, corresponding to calculated specific activities of mono- and di-iodo heptadecapeptide gastrin, resp. The iodinated gastrins did not differ significantly from unmodified gastrins in immunoreactivity and in stimulating acid secretion in the gastric fistula dogs. The results suggest that under appropriate conditions, iodinated gastrins can be used for binding studies with biological receptors.

3109 THE EFFECT ON GASTRIN SECRETION OF AGENTS WHICH INCREASE THE INTRACELLULAR CONCENTRATION OF 3',5'-ADENOSINE MONOPHOSPHATE.

(Eng.) Hayes, J. R.; Williams, R. H. (Dept. Medicine, Queen's Univ. Belfast, Northern Ireland). *Endocrinology* 97(5):1210-1214; 1975.

An *in vitro* radioimmunoassay technique was used to study the effect of agents known to increase intracellular cyclic AMP (cAMP) levels on gastrin release in male Wistar rats. Isuprel (10^{-5} M), prostaglandin E_1 (10^{-5} M), theophylline (10^{-4} M), and dibutyryl cAMP (5×10^{-4} M) did not affect gastrin release when used alone, but each enhanced arginine-stimulated (0.5 g/100 ml) gastrin release. A biphasic pattern of gastrin release in response to arginine was seen in all experiments. By analysis of variance, the gastrin levels over the initial 7.5 min and over the last 20 min of stimulation were significantly greater than baseline values. Gastrin levels returned to basal concentrations following stimulus withdrawal. The studies emphasize the close functional similarity between the release process of the G cell and that of the B cell of the pancreatic islet.

3110 THE EFFECT OF AN ALDOSTERONE ANTAGONIST ON THE PROTECTIVE ACTION OF CARBENOXOLONE ON THE GASTRIC MUCOSAL BARRIER.

(Eng.) Rees, W. D. W.; Rhodes, J.; Cross, S.; Hole, D. (Univ. Hosp. Wales, Heath Park, Cardiff, U.K.). *J. Pharm. Pharmacol.* 27(12):903-906; 1975.

The effect of spironolactone on the protective action of carbenoxolone sodium on the gastric mucosal barrier was studied in three dogs with Heidenhain pouches. The net fluxes of hydrogen ion and sodium ion were measured before, during, and after contact with a 10 mM bile acid solution at pH 2, in pouches which had not been treated with drugs, in pouches treated with carbenoxolone sodium (30 ml of 0.33% solution for 1 hr daily over 4 weeks), and in pouches treated with both carbenoxolone sodium and spironolactone (0.083% solution for treatment of the pouch, and 25 mg/day, p.o.). Hydrogen ion back diffusion from, and sodium ion gain by the untreated pouch were increased by 10 mM bile acid solution. Addition to the pouches of either carbenoxolone sodium, alone, or carbenoxolone sodium and spironolactone reduced the hydrogen ion back diffusion after exposure to the bile-acid solution. The spironolactone did not change the protective effect of carbenoxolone on the gastric mucosal barrier. Carbenoxolone did not change the increased sodium ion diffusion caused by bile. These results confirm that bile alters the permeability of the mucosal barrier to sodium and hydrogen ions in Heidenhain pouches and that preparation of the pouch with carbenoxolone prevents the increased flux of hydrogen ion that usually follows exposure to bile. Spironolactone did not affect this protective action, suggesting that the mechanisms by which spironolactone reduces ulcer healing are not related to its topical action on the gastric mucosa.

3111 GASTRIC SECRETORY RESPONSE TO DIFFERENT DOSES OF CARBACHOL AND PENTAGASTRIN IN MAN.

(Eng.) Vatn, M. H.; Myren, J. (Ulleval Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 11(4):421-425; 1976.

In six healthy subjects, the gastric secretion of acid, pepsin, and intrinsic factor (IF) was measured during 1 hr at basal conditions, and during 1 hr of stimulation with 0.01 μg/kg/hr and thereafter during 1 hr of stimulation with 0.1 μg/kg/hr of pentagastrin. On separate days, the same dose of pentagastrin was given in combination with 0.15 μg/kg/hr or 1.5 μg/kg/hr of carbachol, or stimulation was performed with each of the two doses of carbachol alone. A dose-dependent relation was found between carbachol and the output of acid, pepsin, and IF. The responses to carbachol were independent of changes in plasma gastrin concentration. The acid- and IF-secretions stimulated by the largest dose of pentagastrin were significantly increased by the largest dose of carbachol, whereas the secretion of pepsin was not. It is suggested that pentagastrin and carbachol interact by competitive augmentation on the gastric secretion of acid and IF.

3112 EFFECT OF ALTERATIONS OF BLOOD GLUCOSE LEVELS ON GASTRIC ACID SECRETION, PLASMA GASTRIN, AND PLASMA OSMOLALITY IN MAN.

(Eng.) Stacher, G.; Schulze, D.; Pointner, H.; Landgraf, M. (Psychophysiologisches Laboratorium, Psychiatrische Universitatsklinik, Lazarettgasse 14, 1090 Wien, Austria). *Am. J. Dig. Dis.* 21(7):563-568; 1976.

The effect of alterations of blood glucose levels on gastric acid secretion, plasma gastrin, and plasma osmolality was investigated in 16 experiments on 4 healthy subjects. Each subject underwent four different experimental procedures, each lasting 4 hr. All had in common 1 basal hr and the infusion of

0.2 U/kg/hr insulin in the second hr, but all subjects differed in the time of infusion of 0.66 g/kg/hr glucose or isotonic saline. Acid output was measured continuously by means of intragastric titration and a telemetering capsule, while blood glucose, plasma gastrin, and plasma osmolality were determined in 15-min intervals. During simultaneous infusion of insulin and glucose, during the second hr there was a decrease of acid production with increasing glucose levels. There were highly significant differences ($p<0.001$) for both acid output and blood glucose. In the third and fourth hr, no significant differences between treatments were found for the variables plasma gastrin and osmolality. In the third hr, massive treatment effects were observed for blood glucose ($p<0.001$) and acid output ($p<0.001$). Glucose levels fell sharply after glucose infusion was stopped, but it declined only slightly when glucose administration was continued. By the fourth hr, acid output generally showed inverse tendencies as compared with the glucose levels. The results indicate that there is a definite relation between blood glucose levels and gastric acid secretion. It is suggested that an analagous mechanism, based solely on the blood glucose levels, can be held responsible for the inhibitory effect of glucose on gastric acid secretion in man.

3113 EFFECT OF SECRETIN ON RELEASE OF HETEROGENEOUS FORMS OF GASTRIN.

(Eng.) Straus, E.; Greenstein, A. J.; Yalow, R. S. (Veterans Admin. Hosp., 130 West Kingsbridge Road, Bronx, NY 10468). *Gut* 16(12):999-1005; 1975.

Basal gastrin levels and gastrin responses to i.v. injection of Boots secretin were studied in 22 fasting control subjects. After injection of 1 U Boots secretin/kg, a maximal decrease in gastrin concentration averaging 7 pg/ml was achieved at 10 min. It returned to normal (50 pg/ml) at 1 hr. An i.v. injection of 4 U Boots secretin/kg decreased the gastric concentration to 9 pg/ml at 15 min. Eight of the 22 subjects showed no significant change in gastrin concentration after secretin injection, but there were significant pancreatic responses, as measured by duodenal fluid volume and bicarbonate increases. In three patients with pernicious anemia, secretin injection was followed by a fall in gastrin levels; the minimum was reached in less than 1 hr. In seven subjects given test meals, both with and without prior injection of 4 U Boots secretin/kg, the test meal alone provoked a mean maximal increase from a basal level of 60 pg/ml to 120 pg/ml in 20 min. After secretin injection, the test meal provoked a mean maximal increase of only 30 pg/ml over the initial value. Sephadex G-50 fractionation of fasting plasma samples from 12 control subjects demonstrated that the predominant component was generally big big gastrin (BBG, over 90% in 4 of 12 patients). These four patients had no significant lowering of basal gastrin by secretin injection. Significant depression of the gastrin level after secretin injection was observed only in patients in whom big gastrin (BG) and heptadecapeptide gastrin (HG) were prominent components of the fasting gastrin. These results demonstrate that a bolus injection of secretin is capable of inhibiting gastrin release but that its apparent effect depends upon the distribution of the forms of gastrin in the plasma.

3114 THE INFLUENCE OF SECRETIN ON THE SECRETION OF PEPSIN IN RESPONSE TO ACID STIMULANTS IN THE ANAESTHETIZED CAT.

(Eng.) Braganza, J. M.; Gibbs, A. C. C.; Howat, H. T. (Manchester Royal Infirmary, Manchester, England). *J. Physiol. (Lond.)* 252(3):791-801; 1975.

The effects of cerulein, histamine, and *N*-methyl histamine on peptic secretion was studied in fasting anesthetized cats in which the pylorus and common bile duct were occluded to prevent the release of duodenal hormones that might stimulate or inhibit gastric secretion. Dilute acid was instilled into the stomach at intervals to aid recovery of gastric secretion and to preserve peptic activity. Cerulein (2.5-20 ng/kg/min), histamine (375-1,500 ng/kg/min), and *N*-methyl histamine (375-3,000 ng/kg/min) did not increase the output of pepsin when given alone. Desulfated cerulein was a weak peptic stimulant. Two Crick, Harper, and Raper (C.H.R.) U/kg/hr secretin initiated pancreatic secretion, the volume of which increased progressively as the dose was increased to 32 C.H.R. U/kg/hr. Four C.H.R. U/kg/hr secretin did not increase the output of pepsin. Peptic secretion was stimulated by 8 C.H.R. U/kg/hr. A maximal output of approximately 2,000 U pepsin/15 min was obtained when 16 C.H.R. U/kg/hr was infused. When each acid stimulant was infused along with 4 C.H.R. U/kg/hr secretin, the output of pepsin increased significantly. The peak output, which usually occurred between 15 and 30 min after stimulation, did not exceed 1,000 U pepsin/15 min. It is concluded that the potentiation of the peptic response when an acid stimulant is infused along with a dose of secretin (in itself below the threshold of peptic stimulation) is due to the fact that each acid stimulant increases gastric mucosal blood flow, approximately doubling the effective concentration of secretin delivered to the peptic cell.

3115 EFFECT OF UROGASTRONE ON GASTRIC SECRETION AND PLASMA GASTRIN LEVELS IN NORMAL SUBJECTS.

(Eng.) Elder, J. B.; Ganguli, P. C.; Gillespie, I. E.; Gerring, E. L.; Gregory, H. (Royal Infirmary, Manchester, England). *Gut* 16(11):887-893; 1975.

The effect of urogastrone on gastric acid, pepsin, and intrinsic factor secretion, and on plasma gastrin concentration using pentagastrin, histamine, and insulin as stimulants was investigated in 12 normal men. Clinical, hematological, and biochemical screening tests were conducted throughout the study. Six volunteers received i.v. pentagastrin (0.2 μg/kg/hr) 60-90 min prior to 0.125, 0.25, or 0.5 μg/kg/hr urogastrone. Another six subjects received 0.25 μg/kg/hr urogastrone following injection of 0.2 μg/kg/hr pentagastrin, 10 μg/kg/hr histamine acid phosphate, or 0.2 U/kg/hr soluble insulin. Urogastrone inhibited acid and intrinsic factor secretion whether stimulated by pentagastrin (60%, 85%, and 90% for 0.125, 0.25, and 0.5 μg urogastrone, resp.), histamine (to 40%), or insulin (30%), but it had a much less marked effect on gastric pepsin output. Plasma gastrin levels did not alter significantly. A dose of 0.25 μg urogastrone/kg/hr resulted in inhibition of acid output of 80% and was not associated with clinical side effects. No significant alteration in any of the hematological or biochemical measurements was observed in any of the subjects. The results indicate that urogastrone is an effective inhibitor of acid secretion stimulated by exogenous submaximal pentagastrin and by histamine, and by maximally effective doses of insulin.

3116 THE EFFECT OF SYMPATHETIC NERVE STIMULATION ON SERUM GASTRIN, GASTRIC ACID SECRETION AND MUCOSAL BLOOD FLOW RESPONSES TO MEAT EXTRACT STIMULATION IN ANAESTHETIZED CATS. (Eng.) Blair, E. L.; Grund, E. R.; Reed, J. D.; Sanders, D. J.; Sanger, G.; Shaw, B. (Univ. Newcastle-upon-Tyne Medical Sch., Newcastle-upon-Tyne, NE1 7RU, England). *J. Physiol. (Lond.)* 253(2):493-504; 1975.

The effect of sympathetic nerve stimulation on serum gastrin, gastric acid secretion, and mucosal blood flow (MBF) responses to meat extract stimulation was investigated in the cat. Chloralose anesthetized cats were prepared with fundic and antral pouches. Fundic MBF was measured by the amidopyrine technique and serum gastrin was measured by radioimmunoassay. Meat extract suspension (7.5%) in the antral pouch increased gastric acid output and mucosal blood flow in the fundic pouch during the first 70 min of stimulation. Thereafter, the acid output and mucosal blood flow declined significantly ($p<0.05$). The $\Delta MBF/\Delta H^+$ ratio from the meat extract experiments was not significantly different ($p>0.5$) from the published values for gastrin stimulation under different experimental conditions. The arterial serum gastrin concentration was increased sixfold. Splanchnic nerve stimulation, during responses to meat extract stimulation, produced significant reductions in gastric acid secretion ($p<0.025$), fundic mucosal blood flow ($p<0.02$), arterial serum gastrin concentration ($p<0.01$), and gastrin delivered to the mucosa ($p<0.001$). In the 30-min period following the end of splanchnic nerve stimulation, only arterial serum gastrin concentration remained significantly reduced. The results indicate that in the anesthetized cat, stimulation of the sympathetic nerve supply to the abdomen not only significantly inhibits the fundic acid secretory and mucosal blood flow responses, but it also significantly reduces the rise in serum gastrin concentration produced in response to meat extract suspension in the pyloric antrum.

3117 BIOASSAY OF INHIBITORY ACTIVITY OF GASTRONE ON BASAL HCL SECRETION IN RATS WITH CHRONIC GASTRIC FISTULA. (Eng.) Balanzo, J. T.; Glass, G. B. J. (New York Medical Coll., New York, NY). *Digestion* 13(6):334-343; 1975.

3118 QUANTITATIVE ASPECTS OF THE VAGAL CONTROL OF GASTRIN RELEASE IN CATS. (Eng.) Uvnas-Wallensten, K.; Uvnas, B.; Nilsson, G. (Dept. Pharmacology, Karolinska Institutet, Stockholm, Sweden). *Acta Physiol. Scand.* 96(1):19-28; 1976.

3119 EFFECT OF DENERVATION OF PYLORIC ANTRUM ON THE GASTRIC SECRETORY RESPONSE TO FOOD. (Eng.) Hunt, D. R.; Forrest, A. P. M. (United Cardiff Hosp., Cardiff, Wales). *Aust. J. Exp. Biol. Med. Sci.* 53(6):499-514; 1975.

3120 SYNTHESIS OF THE TRITETRACONTAPEPTIDE CORRESPONDING TO THE ENTIRE AMINO ACID SEQUENCE OF GASTRIC INHIBITORY POLYPEPTIDE. (Eng.) Yajima, H.; Ogawa, H.; Kubota, M. (Faculty Pharmaceutical Sciences, Kyoto Univ., Kyoto 606, Japan). *J. Am. Chem. Soc.* 97(19):5593-5594; 1975.

3121 NEUROACTIVE AMINO ACID LEVEL IN THE HYPOTHALAMUS AND LIVER OF RATS WITH EXPERIMENTALLY INDUCED GASTRIC ULCER, AND ITS CHANGES UNDER THE ACTION OF CHOLINOLYTIC PREPARATIONS. (Rus.) Mirzoian, S. A.; Tatevosian, A. T. (Erevan Medical Inst., Erevan, USSR). *Zh. Eksp. Klin. Med.* 15(5):6-10; 1975.

3122 ION TRANSPORT IN NON-ACID SECRETING GASTRIC EPITHELIUM [Abstract]. (Eng.) Flemstrom, G. (Dept. Physiology, Univ. Uppsala, Uppsala, Sweden). *Acta Physiol. Scand.* 95(2):11A-12A; 1975.

3123 CORRELATION OF ISOLATED, ENRICHED GASTRIN CELL FRACTIONS TO RADIOIMMUNOASSAYABLE GASTRIN [Abstract]. (Eng.) Forssmann, W. G.; Lichtenberger, L. M.; Romrell, L. J.; Ito, S. (Harvard Medical Sch., Boston, MA). *J. Cell Biol.* 67:120a; 1975.

3124 ISOLATED GASTRIC GLANDS: A NEW APPROACH FOR THE STUDY OF GASTRIC SECRETION [Abstract]. (Eng.) Berglindh, T. (Dept. Physiology, Univ. Uppsala, Uppsala, Sweden). *Acta Physiol. Scand.* 95(2):16A-17A; 1975.

3125 GASTRIN AND HISTAMINE IN THE REGULATION OF GASTRIC SECRETION. (Pol.) Kaulbersz, J. (Instytut Fizjologii AM, 31-531 Krakow, ul. Grzegorzecka 16, Poland). *Przegl. Lek.* 32(3):350-354; 1975.

3126 THE EFFECT OF INDOMETHACIN TREATMENT ON SECRETION OF ELECTROLYTES, TOTAL PROTEIN, MUCOPROTEIN AND SIALIC ACID IN GASTRIC JUICE. (Pol.) Adamska-Dyniewska, H.; Bala, T.; Goch, J. H.; Kowalczyk, L. (Szpital im. dr Bieganskiego, ul. Kniaziewicza 1/5, 91-347 Lodz, Poland). *Wiad. Lek.* 28(13):1117-1121; 1975.

3127 CALCULATION AND DEFINITION OF STIMULATED GASTRIC JUICE SECRETION. (Ger.) Poge, A. W.; Albert, H.; Mlynek, H.-J. (Chirurgische Klinik, Karl-Marx-Universitat, DDR-701 Leipzig, Liebigstrasse 20a, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 35(3):123-127; 1975.

See also, 3065, 3076, 3221, 3241, 3250, 3386, 3797.

SECRETION AND METABOLISM

Pancreas

3128 FETAL AND NEONATAL RAT PANCREAS IN ORGAN CULTURE: AGE RELATED EFFECTS OF CORTICOSTERONE ON THE ACINAR CELL COMPONENT. (Eng.) McEvoy, R. C.; Hegre, O. D.; Lazarow, A. (Dept. Anatomy, Univ. Minnesota, Minneapolis, MN 55455). *Am. J. Anat.* 146(2):133-150; 1976.

The effects of organ culture, with corticosterone supplementation, on the morphological and biochemical development of the exocrine portion of the rat pancreas at different developmental stages were investigated. Fetal Sprague-Dawley rat pancreas (aged 16-22 days postcoitum) and neonatal pancreas (4 days postnatal) were grown in organ culture (chick embryo extract and rooster serum) either with or without the addition of corticosterone (3×10^{-5} M) for 4 days. Acinar cell differentiation was assessed using quantitative light microscopic linear scanning of tissue sections and enzymatic analysis of amylase in the culture media and in the explants. In the younger fetal tissue of 16 and 18 days postcoitum, exocrine differentiation continued *in vitro*. Supplementation of the media with corticosterone resulted in an enhancement of the *in vitro* acinar cell differentiation in immature fetal explants of both 16 ($p<0.001$) and 18 days ($p<0.001$) postcoitum. The resulting pancreatic cytoarchitecture resembled that of neonatal or adult pancreas with acinar cells comprising 58% of tissue volume. The levels of tissue enzyme activity were still only 10-20% of that attained during a comparable *in vivo* developmental period. The *in vitro* effects of corticosterone on 4-day neonatal tissue included full preservation of explant acinar cell mass and tissue amylase content and 20-fold higher media amylase levels ($p<0.001$). The data suggest that corticosterone can stimulate or maintain the development of normal pancreatic morphology *in vitro*, i.e., promote an adult percentage of light microscopically identifiable acinar cells.

3129 PARASYMPATHETIC INNERVATION AND PANCREATIC SECRETION: THE ROLE OF THE GASTRIC ANTRUM. (Eng.) Rosenberg, I. R.; Zambrano, V. J.; Janowitz, H. D.; Rudick, J. (Mount Sinai Hosp., 11 East 100th St., New York, NY 10029). *Ann. Surg.* 183(3):247-251; 1976.

The role of the antrum on vagally mediated pancreatic secretion was studied in eight conscious dogs prepared with chronic pancreatic and gastric fistulae. After completion of control studies, six animals were subjected to antrectomy, and two were subjected to antroneurolysis (to interrupt submucosal nerve connections); secretory studies were repeated. With the animals secreting in response to secretin (0.3 U/kg/min) or secretin with cholecystokinin (0.05 U/kg/min), the following were administered: (a) insulin, 0.2 U/kg; (b) atropine, 0.2 and 0.4 mg/kg; and (c) insulin after atropine. Insulin hypoglycemia elicited a marked enzyme response. Both antrectomy and antroneurolysis reduced the enzyme response to insulin hypoglycemia by 80%. Atropine (0.2 mg/kg) abolished the insulin response, and at 0.4 mg/kg, it inhibited the enzyme response to cholecystokinin by 50%; these effects were unaltered by antrectomy or antroneurolysis. The experiments suggest that the pancreatic enzyme response to insulin hypoglycemia is predominantly mediated through the vagal release of antral gastrin. Furthermore, antrectomy and antroneurolysis do not affect the enzyme response to cholecystokinin nor do they alter the inhibitory effects of atropine. The inhibition by atropine suggests that a cholinergic background exerts a permissive effect on CCK-mediated enzyme secretion.

3130 DOES HUMAN PANCREAS CONTAIN SALIVARY-TYPE ISOAMYLASE? (Eng.) Shimamura, J.; Fridhandler, L.; Berk, J. E. (Coll. Medicine, Univ. California, Irvine, CA). *Gut* 16(12):1006-1009; 1975.

The isoamylase pattern of normal human pancreatic tissue supernatant was studied by DEAE-Sephadex A-50 chromatography. $CaCl_2$ was omitted from the buffer used during the procedure. Only pancreatic type (P-type) isoamylase was detected at first. However, when effluent fractions were harvested, pooled, concentrated, and rechromatographed, the pancreatic extracts were found to contain salivary type (S-type) amylase, accounting for approximately 0.8-1.7% of the total recovered amylase activity. It is suggested that the recovery of S-type isoamylase in pancreatic extracts may have been caused by penetration of blood filtrates containing amylase, but not hemoglobin, into the intra- or extracellular spaces of the pancreas.

3131 EXOCRINE PANCREAS: EVIDENCE FOR TOPOGRAPHIC PARTITION OF SECRETORY FUNCTION. (Eng.) Malaisse-Lagae, F.; Ravazzola, M.; Robberecht, P.; Vandermeers, A.; Malaisse, W. J.;

Orci, L. (Geneva Univ. Sch. Medicine, Geneva, Switzerland). *Science* 190(4216):795-797; 1975.

The concentration of hydrolases was measured in pancreatic exocrine tissue surrounding the islets of Langerhans (peri-insular halos) and in the tele-insular area of the pancreas from spiny mice (*Acomys cahirinus*) and from normal and diabetic (induced by 40-60 mg/kg streptozotocin, i.v.) mice. The relative concentration of amylase in spiny mice occupied an intermediate position between that of normal and diabetic rats. Among nine computed ratios of tele-insular to peri-insular values for the relative amounts of hydrolases in each animal, seven differed significantly ($p<0.05$ or less). The concentration of amylase relative to that of lipase was invariably higher in the tele-insular than in the peri-insular exocrine tissue in all three, and highly significant differences ($p<0.005$) were found at least once in each animal group. The findings indicate that the precise concentration of each hydrolase in pancreatic juice and its adaptation to environmental factors (e.g., type of food) may be governed, at least partially, by a coordinated participation of hormones emerging from both the gastrointestinal mucosa and the islets of Langerhans and affecting topographically distinct areas of the exocrine pancreas.

3132 ROLE OF CALCIUM IN EXOCRINE PANCREATIC SECRETION. III. COMPARISON OF CALCIUM AND MAGNESIUM MOVEMENTS IN RABBIT PANCREAS.

(Eng.) Schreurs, V. V. A. M.; Swarts, H. G. P.; De Pont, J. J. H. H. M.; Bonting, S. L. (Dept. Biochemistry, Univ. Nijmegen, Nijmegen, Netherlands). *Biochim. Biophys. Acta* 436(3):664-674; 1976.

Calcium and magnesium movements in the isolated rabbit pancreas and in rabbit pancreas fragments were compared qualitatively and quantitatively. At the basal secretion rate, calcium and magnesium were present in the secreted fluid in concentrations of about 30% of their concentrations in the bathing medium. Addition of 10^{-6} M carbachol to the bathing medium resulted in enzyme secretion accompanied by calcium and magnesium release, in divalent cation-free medium as well as in a complete medium. The secretion of each divalent cation was determined to be the sum of two components: an extracellular flux and a flux of protein-associated cations, the so-called secretory flux. The extracellular flux was proportional to the concentration of the divalent cation in the bathing medium. The secretory flux was not dependent upon the presence of the divalent cation in the bathing medium, but it was proportional to the amount of protein secreted. About 25 nmol of each cation was secreted per mg protein. Ca^{2+} and Mg^{2+} were nearly completely separated from the digestive enzymes by gel filtration. They equilibrated completely with their radioactive isotopes, which were added to the sample just before elution, indicating that the cations are rapidly exchangeable after secretion. Efflux studies on rabbit pancreas fragments, pre-loaded with $^{45}Ca^{2+}$, showed a carbachol-stimulated $^{45}Ca^{2+}$ efflux (the stimulatory flux) in addition to a release of amylase. Fragments pre-loaded with $^{28}Mg^{2+}$ did not show carbachol stimulation of the tracer efflux. These studies indicate that calcium and magnesium behave quite similarly with respect to the extracellular and secretory fluxes. The absence of a stimulatory flux for magnesium suggests that the increase of the cytoplasmic calcium concentration plays a specific role in the stimulus-secretion coupling of pancreatic enzyme secretion.

3133 Na^+ DEPENDENCE OF IN VITRO PANCREATIC AMYLASE RELEASE.

(Eng.) Williams, J. A. (Dept. Physiology, Univ. California, San Francisco, CA 94143). *Am. J. Physiol.* 229(4):1023-1026; 1975.

The effects of Na^+ on the *in vitro* secretion of amylase from Swiss mice pancreas were studied. Replacement of Na^+ in the medium by Tris, choline, or sucrose blocked the stimulation of amylase release by bethanechol and cerulein, whereas replacement by Li^+ had no effect. The inhibition was rapid and reversible, and stimulated amylase release was linearly related to the log of the Na^+ concentration over the range of 20-100 mM Na^+. Enzyme release stimulated by the Ca^{2+} ionophore A23187 was unaffected by removal of Na^+ from the medium. Tissue and intracellular Na^+ and K^+ contents were unchanged after stimulation of secretion by physiological stimulants. The results suggest that Na^+ may be important in the early steps of stimulus-secretion coupling, leading to the putative rise in intracellular Ca^{2+} that triggers pancreatic enzyme release.

3134 CHYMODENIN, A DUODENAL PEPTIDE: SPECIFIC STIMULATION OF CHYMOTRYPSINOGEN SECRETION.

(Eng.) Adelson, J. W.; Rothman, S. S. (Dept. Physiology, California Univ., San Francisco, CA 94143). *Am. J. Physiol.* 229(6):1680-1686; 1975.

The effect of chymodenin on the secretion of enzymes was investigated *in situ* and *in vitro* in albino male New Zealand rabbit pancreas. A 10^{-8} M injection of chymodenin rapidly increased chymotrypsinogen (ChTg) secretion ($p<0.01$), did not increase lipase secretion, and modestly enhanced protein secretion ($p<0.025$). The increased ChTg output was too rapid to be the result of increased rates or protein synthesis and could not be attributed to the exocytosis of zymogen granule contents because of the enzyme specific nature of the response. In *in vitro* studies, methacholine chloride (1 mg/125 ml bathing solution) was added to the bathing medium of isolated pancreas. Total protein and ChTg outputs were increased four to sevenfold by cholinergic treatment, while lipase output was increased nearly 30-fold ($p<0.05$ for protein versus lipase, and $p<0.01$ for ChTg versus lipase). Regression lines were calculated for individual periods for ChTg and lipase outputs, under control and chymodenin stimulated conditions. The regression lines were each significant at less than the 5% level. The three slopes differed from each other at the $p<0.001$ level (beta chymodenin, 0.898; control, 0.395; and beta methacholine, 0.011). The existence of a duodenal peptide, which produces an enzyme specific response, supports the hypothesis that the secretion of digestive enzymes during digestion is a highly regulated process in which the enzyme content of pancreatic secretion varies according to the composition of intestinal substrates.

3135 EFFECT OF DIETARY PROTEIN ON PROTEOLYTIC ACTIVITIES IN THE PANCREATIC TISSUE AND CONTENTS OF THE SMALL INTESTINE IN RATS. (Eng.) Ikegami, S.; Takai, Y.; Iwao, H. (Natl. Inst. Nutrition, Tokyo, Japan). *J. Nutr. Sci. Vitaminol. (Tokyo)* 21(4):287-295; 1975.

The time courses of proteolytic activities in pancreatic tissue and the contents of the small intestine were determined in male Wistar rats maintained on a diet containing 30% of various proteins, after a switchover from a diet containing 12% casein. The proteolytic activity of the pancreatic tissue quickly responded (within 1-6 days) to change of dietary proteins, with respect to organ weight, nitrogen content, and proteolytic activity, in rats receiving diets containing 30% casein, ovalbumin, lactalbumin, gluten, gelatin, or zein. However, the proteolytic activity in the intestinal contents did not necessarily coincide with the pancreatic digestive function. An approximately threefold increase of enzyme activity was demonstrated on the fifth day of feeding in rats receiving gluten. The proteolytic activity in the intestinal contents returned to the initial level on the eighth day in the gluten fed rats, but rats maintained on a lysine supplemented gluten diet exhibited no such elevation of proteolytic activity. No significant difference in pancreatic composition was shown up to the eighth day in the group receiving gluten alone and in the group receiving the same diet supplemented with lysine under the condition of equally restricted food intake. Intestinal trypsin and chymotrypsin levels were higher in the gluten fed rats, suggesting that the depressed rate of enzyme inactivation in the small intestine may be the principal cause of increased enzyme action in rats receiving gluten.

3136 STUDIES ON INTRACELLULAR TRANSPORT OF SECRETORY PROTEINS IN THE RAT EXOCRINE PANCREAS. III. EFFECT OF COBALT, LANTHANUM AND ANTIMYCIN A. (Eng.) Bieger, W.; Seybold, J.; Kern, H. F. (Dept. Anatomy, Univ. Heidelberg, Heidelberg, W. Germany). *Virchows Arch.* [*Pathol. Anat.*] 308(4): 329-345; 1975.

The effects of cobalt and lanthanum on the secretory process of the rat exocrine pancreas was studied *in vitro* using isolated pancreatic lobules. Cobalt (10^{-3} to 10^{-5} M) had no effect on the rate of protein synthesis, intracellular transport, or discharge of zymogen granules, if the total population of stored granules was considered. However, it had a marked effect on the release of newly packed zymogen granules that were formed during incubation in 10^{-3} M $CoCl_2$. Determination of specific radioactivity in amylase released under the stimulation of 5×10^{-6} M carbamylcholine and of total proteins retained in the zymogen granule fraction during stimulation indicated that granules formed during incubation in $CoCl_2$ are excluded from discharge. Lanthanum had a differential effect on protein synthesis, intracellular transport, and discharge. Incorporation of tritiated leucine into trichloroacetic acid precipitable proteins was inhibited by 50% at 10^{-3} M $LaCl_3$. Intracellular transport, as studied by cell fractionation, was not changed during the first 35 min post pulse, but was delayed thereafter. This late effect was more pronounced if pancreatic lobules were preincubated for 60 min in 10^{-3} M $LaCl_3$. Discharge of amylase and newly synthesized proteins was inhibited dose-dependently up to 80% by 10^{-3} M $LaCl_3$. The effects of both cobalt and lanthanum were not due to an inhibition of cellular respiration. Comparison of these results with the inhibitory action of antimycin A (10^{-4} to 10^{-8} M) revealed a dose-dependent diminution of the rate of protein synthesis and intracellular transport, while discharge of granules was less energy-dependent. The fine structural appearance of pancreatic lobules after 3 hr incubation in 10^{-3} M $CoCl_2$ was not altered, while in 5×10^{-3} and 10^{-3} M lanthanum acinar lumina were enlarged, and the apical cytoplasm contained large vacuoles. At the highest concentration of lanthanum, a flocculent electron-dense material was apposed to the external lamina of the plasma membrane. Antimycin A led to cellular changes corresponding to the irreversible inhibition of cellular respiration. It is concluded that cobalt acts on the process of granule formation inside the cell, while lanthanum may alter molecules involved in secretagogue binding and transport systems into the cell.

3137 STIMULATED FLOW OF PANCREATIC AND BILIARY SECRETIONS AFTER INTESTINAL EXPOSURE TO CHOLERA TOXIN. (Eng.) Freiman, I.; Melmed, R. N. (Hadassah-University Hosp., P.O. Box 499, Jerusalem, Israel). *Clin. Sci. Mol. Med.* 51(1):81-85; 1976.

The duodeno-jejunal intestinal loops in female albino Wistar rats were perfused with cholera toxin and pancreatic and biliary secretory responses were studied. Cholera toxin (30 µg), dissolved in NaCl, was injected through the proximal catheter into the intestinal loop. An active intestinal secretion of fluid resulted, and it increased gradually to a peak at the 4th hr after exposure to toxin ($p<0.005$) and persisted for an additional 4 hr. Intestinal fluids in the control rats decreased until the 5th hr and remained at a significantly lower volume. There was a progressive increase ($p<0.05$ at the 4th hr, $p<0.01$ at the 5th hr, and $p<0.001$ at the 6th hr) in secretory volume from the pancreatic fistula of the rats exposed to cholera toxin, with a tendency for the protein secretion to fall away after the 7th and 9th hr. Biliary secretion was sustained through the 5th hr in rats exposed to cholera toxin. After this period, there was a progressive reduction of biliary secretion, although a significant difference between the cholera toxin and control groups was maintained through the 6th, 7th, and 8th hr ($p<0.05$). The difference between the mean volume of secretion in the first and last hours was still much lower in the cholera toxin treated group (25%) reduction than in the control group (49%) reduction. The failure of i.v. administered cholera toxin to reproduce the stimulatory pattern of pancreatic and biliary secretion induced by intraluminal choleragen confirms the mediation of mucosal factors in the cholera toxin induced response. It is also suggested that secretion from the pancreas and liver may significantly contribute to the total intestinal secretion in cholera.

3138 DEVELOPMENT OF SECRETORY RESPONSE IN PANCREATIC EXOCRINE CELLS [Abstract]. (Eng.) Doyle, C. M.; Jamieson, J. D. (Section Cell Biology, Yale Univ., New Haven, CT). *J. Cell Biol.* 67:100a; 1975.

3139 PANCREATIC ENZYMATIC ADAPTATION TO QUALITATIVELY DIFFERENT PROTEIN AND FAT IN THE DIET IN INFANTS DURING THE FIRST YEAR OF THEIR LIVES. (Rus.) Khar'kova, R. M.; Bogomolova, I. B. (Moscow Scientific Res. Inst. Pediatrics, Russian SSR Ministry Health, Moscow, USSR). *Pediatriia* (11):18-19; 1975.

3140 PANCREATIC SECRETION TEST IN PREGNANCY. (Ger.) Zastrow, R. (Klinik fur Innere Medizin der Univ., 25 Rostock, Ernst-Heydemann-Strasse, Germany). *Z. Gesamte Inn. Med.* 30(10): 356-362; 1975.

See also, 3081, 3092, 3246.

SECRETION AND METABOLISM

Hepatobiliary Tract

3141 ^{131}I-ASIALO-α_1-ACID GLYCOPROTEIN. INVESTIGATION OF ITS USE FOR LIVER FUNCTION TESTS; METABOLISM IN THE RAT. (Eng.) van Rijk, P. P.; van den Hamer, C. J. A. (Inst. Nuclear Medicine, Univ. Hosp., Utrecht, Netherlands). *J. Lab. Clin. Med.* 88(1):142-150; 1976.

The *in vivo* behavior of i.v.-administered ^{131}I-asialo-α_1-acid glycoprotein was examined in male Wistar rats to determine whether or not glycoproteins without terminal sialic acid can be used for liver function studies in nuclear medicine. Activity in plasma, liver, and other tissues was measured as a function of time. ^{131}I-asialo-α_1-acid glycoprotein was rapidly removed from the circulation. Five min after injection, only a few percent (0.20-0.26%/ml plasma) of the injected dose remained in the plasma, and 75% was found in the liver, where it was localized in the hepatocytes. However, 15 min after injection, the ^{131}I reappeared in the plasma after the labeled protein had been metabolized by the liver. One hr after injection, less than 5% of the injected dose remained in the liver. Studies with this material in a series of rats using a gammacamera showed the reproducibility of the time-activity curves of the liver. In contrast, the unmodified radioactive α_1-acid glycoprotein disappeared from the blood at a much slower rate. The disappearance curve of the unmodified α_1-acid glycoprotein could be fitted with the sum of two exponential curves with half-times of 2.88 H and 27.3 H, resp. The ^{131}I-α_1-acid glycoprotein did not accumulate in any tissue except the kidneys, and some of the radioactivity was excreted in the urine. It is suggested that the mode of uptake and catabolism of asialo-α_1-acid glycoprotein is most likely by pinocytosis and digestion in the lysosomes. It is concluded that the modified glycoprotein may provide additional information about liver function when used as a diagnostic tool in nuclear medicine.

3142 HUMAN LIVER ACID PHOSPHATASES. (Eng.) Rehkop, D. M.; Van Etten, R. L. (Chemistry Dept., Purdue Univ., West Lafayette, IN). *Hoppe-Seyler's Z. Physiol. Chem.* 356(11):1775-1782; 1975.

The first purification of a soluble acid phosphatase isoenzyme from human liver to a suitable state for kinetic characterization is described. Chromatography of the supernatant of a crude liver homogenate on a calibrated Sephadex G-200 column resulted in the separation of three peaks of enzyme activity (I, II, and III) capable of hydrolyzing *p*-nitrophenyl phosphate (*p*-NPP). Acid phosphatases I, II, and III had molecular weights of 200,000, 107,000, and 13,400, resp. Following partial purification, isoenzyme II was obtained as a single activity band, as assessed by activity staining with *p*-NPP and alpha-naphthyl phosphate on polyacrylamide gels run at several pH values. With 50 mM *p*-NPP as a substrate, enzymes II and III exhibited plateaus of activity over the pH range 3-5 and 3.5-6, resp. Acid phosphatase II was not significantly inhibited by 0.5% formaldehyde. Human liver acid phosphatase II and human prostatic acid phosphatase also exhibited similar activities to substrates that are currently used in the clinical laboratory. Only choline phosphate, which was readily hydrolyzed by human prostatic acid phosphatase, was not hydrolyzed to a detectable extent by human liver acid phosphatase II. Because the acid phosphatase isoenzyme of human liver can be purified to the level of a single phosphatase activity, it is concluded that its kinetic properties can now be characterized meaningfully.

3143 THE HEPATIC TRANSPORT OF TAUROCHOLIC ACID IN THE RAT: DEVELOPMENT OF A MATHEMATICAL MODEL. (Eng.) Iser, J. H.; Packer, J. S.; Smallwood, R. A.; Hoffman, N. E. (Austin Hosp., Heidelberg, Victoria, 3084, Australia). *Clin. Exp. Pharmacol. Physiol.* 3(1):29-36; 1976.

The transport of taurocholic acid (injected at concentrations of 25-12,800 μM) from portal blood to bile was studied in anesthetized male Sprague Dawley rats by injecting a radiolabeled pulse of bile acid. At all concentrations of taurocholic acid, and in all rats, the label was rapidly secreted into the bile. Fifty percent of the dose was secreted in less than 5 min, and the total dose was secreted within 15 min. The mean time to secrete 50% of the dose varied from 2.7 min with 25 μM labeled taurocholate to 3.9 min for a dose that was more than 500-fold greater. There was a statistically significant linear regression of time to secrete 50% dose on dose ($p<0.05$). The observed peak rate of secretion fell from 32.8%/min at 25 μM injectate to 18.8%/min at 12,800 μM injectate. There was a significant regression against dose ($p<0.01$). The time taken to reach this peak rate increased with increasing dose from a mean of 1.6 min to 2.0 min, and the regression was significant ($p<0.05$). The transport process was modeled with both analogue and digital computers. The simplest model that applied to the data comprised rapid uptake from portal blood, slow transport across the cell, and rapid secretion into bile. The digital computer simulation suggested that this model is not unique, but it will require additional testing.

3144 DUODENAL BILE ACIDS IN INFANCY. (Eng.) Challacombe, D. N.; Edkins, S.; Brown, G. A. (Taunton and Somerset Hosp., Musgrove Park Branch, Taunton, Somerset TA1 5DA, England). *Arch. Dis. Child.* 50(11):837-843; 1975.

Duodenal bile acids were estimated in three age groups (birth-2 days, group 1; 2-7 days, group 2; and 10 days-7 months, group 3), and age related changes were demonstrated in infancy. Five bile acids were measured: glycocholic acid (GC), glycine conjugated dihydroxy bile acids (glycochenodeoxycholic acid and glycodeoxycholic acid, GCDC), taurocholic acid (TC), taurine conjugated dihydroxy bile acids (taurochenodeoxycholic acid and taurodeoxycholic acid, TCDC), and taurolithocholic acid (TLC). There were no significant differences among the age groups in total acid concentration obtained at three sampling periods. The overall mean total bile acid concentrations were significantly greater ($p<0.001$) for group 3 than the overall means for both groups 1 and 2. Taurine conjugated bile acids were the only bile acids present in 16 of 33 samples in group 1, and in 8 of 23 samples in group 2, while all samples in group 3 contained taurine conjugates. Glycine conjugated bile acids were the only bile acids present in 1 of 33 samples in group 1, in 4 of 23 samples in group 2, while all samples in group 3 contained glycine conjugates. The trihydroxy:dihydroxy bile acid ratio was similar in all three groups. The deconjugated bile acids, cholic, deoxycholic, chenodeoxycholic, and lithocholic acids, were not detected in any samples. A bile acid spot with a chromatographic mobility identical to the taurolithocholic acid standard was shown in 18 of 33 samples in group 1, in 10 of 23 samples in group 2, and in all 42 samples from group 3. The results indicate qualitative and quantitative changes, which appear to be age related.

3145 ESTIMATION OF BILE ACID EXCRETION IN MAN: COMPARISON OF ISOTOPIC TURNOVER AND FECAL EXCRETION METHODS. (Eng.) Subbiah, M. T. R.; Tyler, N. E.; Buscaglia, D.; Marai, L. (Mayo Clinic, Rochester, MN 55901). *J. Lipid Res.* 17(1):78-84; 1976.

Bile acid excretion was studied in nine human subjects simultaneously by an isotopic turnover method and by fecal chemical analysis during a balance study. The identities of the fecal bile acids were confirmed by combined gas-liquid chromatography/mass spectrometry. Under the steady state conditions of the patient studies, bile acid excretion values obtained by fecal analysis were 18.1-44.2% lower than the values obtained by the isotopic turnover method. This difference persisted even in those patients given $[^{14}C]$chenodeoxycholic acid (15-41 μCi) instead of $[^{3}H]$chenodeoxycholic acid (30-47 μCi). The fecal excretion values were similar when calculated using either β-sitosterol or chromium sesquioxide as fecal flow markers. The fecal excretion values during the earlier part of the isotopic study were higher than those during the latter part of the study in all but two patients. The lower values of bile acid excretion obtained from fecal analysis could not be explained by the loss of bile acids as sulfate conjugates or by losses due to bile acid degradation in the intestine. It is suggested that bile acid turnover is consistently higher than bile acid excretion under experimental conditions. It is recommended that the data obtained from the isotopic turnover method should not be compared with fecal excretion data.

3146 BILIRUBIN CONJUGATES IN BILE OF MAN, RAT AND DOG. SEMI-QUANTITATIVE ANALYSIS OF BILE COMPOSITION BY THIN LAYER CHROMATOGRAPHY. (Eng.) Noir, B. A. (Dept. Gastroenterology, Haedo, Argentina). *Biochem. J.* 155(2):365-373; 1976.

Bilirubin conjugates in the bile of man, rat, and dog were analyzed by semi-quantitative thin-layer chromatography performed on silicic acid, with phenol/water as the developing solvent; the resulting two fractions were further analyzed by separation of the derived ethyl anthranilate azopigments. Homogeneous and mixed hexuronic acid disease of bilirubin, containing glucuronic acid, were found to constitute 51% of the total conjugates in normal rate bile, 45% of those in human post-obstructive bile, and 38% of those in obstructed rat biles. Monoconjugated bilirubin amounted to 33% of total conjugated bile pigments in normal rat bile, and 17%, and 14% in post-obstructive hepatic human bile and gallbladder bile of the dog, resp. After loading with unconjugated bilirubin, a greater amount of monoconjugates (56%) occurred in the rat bile, wherea bilirubin diglucuronide excretion was decreased (34%) In gallbladder bile of the normal dog, 40% of glucose-containing diconjugates, 32% of homogeneous and/or mixed hexuronic acid (mainly glucuronic acid) diesters of bilirubin, and 14% of xylose-containing diconjugates were estimated. Increased amounts of bilirubin conjugates, including some with unidentified uronic acid groups, were observed in cholestatic rat biles, and quantities of conjugates with glucuronic acid were decreased. It is suggested that the biosynthesis of bilirubin glycosides includes at least two enzymatically catalyzed reaction steps: bilirubin → bilirubin monoglycoside → bilirubin diglycoside. The results suggest that high hepatic concentrations of substrate may influence the regulation *in vivo* of the whole conjugation process by stimulating the first step and/or inhibiting the second.

3147 DIURNAL VARIATIONS IN ACTIVITY OF FOUR PYRIDOXAL ENZYMES IN RAT LIVER DURING METABOLIC TRANSITION FROM HIGH CARBOHYDRATE TO HIGH PROTEIN DIET. (Eng.) Yanagi, S.; Campbell, H. A.; Potter, V. R. (Osaka Univ. Medical Sch., 33 Joan-cho, Kita-ku, Osaka 530, Japan). *Life Sci.* 17(9): 1411-1422; 1975.

The diurnal variations in enzyme activities of tyrosine aminotransferase (TAT), ornithine decarboxylase (ODC), ornithine aminotransferase (OAT), and serine dehydratase (SDH) were studied in male Sprague-Dawley rats, which were trained to a 2-hr meal feeding schedule ("2+22") during metabolic transition from 12.5% to 30% to 60% protein diets over a 21-day period. Although the maximal TAT activity on the first day was slightly lower compared with other days, both TAT and ODC activities adapted rapidly to the increased dietary protein from the first day. The responses of TAT and ODC to the food were so rapid that the maximal value was observed only 4 hr after the onset of feeding. After each feeding, ODC activity decreased rapidly after 4 hr, while TAT activity declined only after 6 hr. No clear diurnal rhythm was observed in either OAT or SDH, though OAT activity tended to decrease from the beginning of the dark period and to resume a slow adaptation after about 4 hr. In contrast to ODC and TAT, both OAT and SDH required about 7 days to fully adapt to the high protein diet. The activities of the four enzymes were also compared after four groups of rats had been adapted to the "2+22" feeding of 12.5, 30, and 60% protein diets and to 60% diet, *ad libitum*, resp. The enzyme activities were not directly proportional to the protein content of the diets, although higher activity was observed on the high protein diets. The diurnal variations in both TAT and ODC were observed in all "2+22" groups. The maximal activities of TAT were found earlier in the 12.5 and 30% protein groups than in the 60% protein group. The peak time for ODC activity was found later in the 12.5% protein group than in rats, which were fed 30% and 60% protein. *Ad libitum* rats fed 60% protein maintained relatively high levels of TAT activity, compared to the rats on the "2+22" schedule. However, the maximal activity of ODC on the 60% protein diet *ad libitum* was so low that a diurnal rhythm was not clearly evident. The results suggest that the biochemistry of enzyme synthesis and degradation may be more advantageously studied if diet and behavior are carefully controlled in *in vivo* experiments.

3148 HORSE LIVER ALDEHYDE DEHYDROGENASE: PURIFICATION AND CHARACTERIZATION OF TWO ISOZYMES. (Eng.) Eckfeldt, J.; Mope, L.; Takio, K.; Yonetani, T. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA 19174). *J. Biol. Chem.* 251(1): 236-240; 1976.

Two isozymes of horse liver aldehyde dehydrogenase (aldehyde, NAD oxidoreductase), F1 and F2, were purified to homogeneity using salt fractionation followed by ion exchange and gel filtration chromatography. The specific activities of the two isozymes in a pH 9.0 system, with propionaldehyde as substrate, were approximately 0.35 and 1.0 μM of NADH/min/mg of protein for the F1 and F2 isozymes, resp. The multiporosity polyacrylamide gel electrophoresis molecular weights of the F1 and F2 isozymes were approximately 230,000 and 240,000, resp. Sodium dodecyl sulfate-polyacrylamide gel electrophoresis gave subunit molecular weight estimates of 52,000 and 53,000 for the F1 and F2 isozymes, resp. The amino acid compositions of the two isozymes were similar; the ionizable amino acid contents were consistent with the electrophoretic and chromatographic behavior of the two isozymes. Both isozymes exhibited a broad aldehyde specificity, oxidizing a wide variety of aliphatic and aromatic aldehydes, and both utilized NAD as coenzyme, but at approximately 300-fold higher coenzyme concentrations both could use NADP. The F1 isozyme exhibited a very low K_m for NAD (3 μM) and a higher K_m for acetaldehyde (70 μM), while the F2 isozyme was found to have a higher K_m for NAD (30 μM) and a low K_m for acetaldehyde (0.2 μM). The two isozymes showed similar chloral hydrate and *p*-chloromercuribenzoate inhibition characteristics, but the F1 isozyme was more sensitive to disulfiram, a physiological inhibitor of acetaldehyde oxidation. Based on its disulfiram inhibition characteristics, it is suggested that the F1 isozyme may be the primary enzyme for oxidizing the acetaldehyde produced during ethanol oxidation *in vivo*.

3149 THE BILIARY EXCRETION OF ^{3}H-MANNITOL AND ^{3}H-IBUTEROL IN UNANAESTHETIZED RATS. (Eng.) Ryrfeldt, A.; Eriksson, H.; Hellstrom, W.; Johansson, M. (Res. Development Labs., AB Draco, S-221 01 Lund, Sweden). *Acta Pharmacol. Toxicol.* 39(1):33-38; 1976.

The biliary clearances of ^{3}H-mannitol (5 and 50 μmol/kg) and ^{3}H-ibuterol (diisobutyrate ester of terbutaline, 0.5 and 5 μmol/kg) after intra-arterial administration were studied in unanesthetized male SPF Sprague-Dawley rats with uninterrupted enterohepatic circulation. The mean bile flow was 0.08 ml/min/kg. The biliary clearance of mannitol ranged from 0.06 to 0.17 ml/min/kg. The biliary clearance of ibuterol and its metabolites (total radioactivity) ranged from 2.05 to 4.81 ml/min/kg, and that of the formed terbutaline ranged from 0.53 to 2.05 ml/min/kg, indicating a concentrative transfer from the plasma to the bile. The cumulative biliary excretion during the 3-hr sampling period amounted to 1% of the administered doses of mannitol and 25% of the doses of ibuterol.

3150 ASSESSMENT OF PROTEIN TURNOVER IN PERFUSED RAT LIVER. EVIDENCE FOR AMINO ACID COMPARTMENTATION FROM DIFFERENTIAL LABELING OF FREE AND tRNA-BOUND VALINE.

(Eng.) Khairallah, E. A.; Mortimore, G. E. (Dept. Biochemistry and Biophysics, Univ. Connecticut, Storrs, CT 06268). *J. Biol. Chem.* 251(5):1375-1384; 1976.

Total protein synthesis in perfused livers of fed male Lewis rats was determined by measuring the rate of valine incorporation based on the specific activity of valine attached to transfer RNA (tRNA). Rates were not significantly altered when perfusate valine was increased from 0.40 to 5 mM and were similar to values calculated earlier from the specific activity of extracellular valine at a concentration of 15 mM. Overall protein degradation, computed from the sum of the rates of synthesis and the total increase of free intra- and extracellular valine, corresponded closely to the increase of free valine that occurred between 5 and 15 min after the addition of cycloheximide. The release of valine from 5 to 15 min was assumed to represent rates of protein degradation in effect prior to the addition of cycloheximide. The close agreement found among these independent assessments of protein metabolism thus appears to eliminate much of the previous uncertainty in the quantitation of hepatic protein turnover. The specific activity of valyl-tRNA attained steady state values that were intermediate between specific activities of the extracellular and intracellular pools but appeared to reach a steady state sooner than that of intracellular valine. The specific activity of valine in tRNA and the intracellular pool was measured in a series of single-pass perfusion experiments; extracellular valine concentration and specific activity were held constant. The intracellular valine specific activity rose with a half-life of 1.2 min. By contrast, the rise in the specific activity of valyl-tRNA was biphasic; the initial phase of the valyl-tRNA curve was rapid, while the second phase had a half-life equal to that of intracellular valine. The data indicate that at physiological concentrations of valine, valyl-tRNA derives its amino acids from both the extracellular and cytoplasmic pools, and that at least some tRNA is charged by extracellular amino acids before they mix with intracellular amino acid pools, possibly from a precursor pool at or near the cell membrane.

3151 APOPROTEINS OF THE LIPOPROTEINS IN A NON-RECIRCULATING PERFUSATE OF RAT LIVER.

(Eng.) Marsh, J. B. (Medical Coll. Pennsylvania, 3300 Henry Ave., Philadelphia, PA 19129). *J. Lipid Res.* 17(1):85-90; 1976.

The apoproteins of serum lipoproteins and of lipoproteins present in a nonrecirculating perfusate of Holtzmann rat liver were compared by immunochemical, gel electrophoretic, and solubility techniques. Serum and perfusate very low density lipoprotein apoprotein compositions were not different. No evidence of lipoprotein resembling serum low density lipoprotein was obtained, but the apoprotein composition of circulatory high density lipoprotein was quantitatively different from the secretory product in the density 1.06-1.21 range. As measured by stained sodium dodecyl sulfate gel electrophoretic patterns, the arginine rich protein was the major secretory apoprotein, while the A-1 protein was the major apoprotein in circulating high density lipoprotein, going from a ratio of 0.3 in serum to 1.7 in the perfusate. A similar pattern was seen in the perfusate of orotic acid-fatty livers. The net release of very low density lipoprotein was 6.6 μg protein/g/hr and of high density lipoprotein, 8.0 μg protein/g/hr, which is 15% and 40%, resp., of the net lipoprotein output of controls. The arginine rich protein isolated from rat serum very low density lipoprotein had a similar amino acid composition to that reported for this protein isolated from rat serum high density lipoprotein. When labeled amino acids were added to the perfusion medium, the arginine rich protein had the highest apparent specific activity at 45 min, and its specific activity was the same in high density lipoprotein as in very low density lipoprotein. The results indicate great similarity between secretory and circulating very low density lipoprotein, no secretion of any lipoprotein resembling low density lipoprotein, and a quantitatively different apoprotein composition of circulatory and secretory high density lipoprotein.

3152 PROPERTIES OF LIVER MITOCHONDRIA FROM IRON-LOADED RATS.

(Eng.) Hanstein, W. G.; Sacks, P. V.; Muller-Eberhard, U. (Scripps Clinic and Res. Foundation, La Jolla, CA 92037). *Biochem. Biophys. Res. Commun.* 67(3):1175-1184; 1975.

The iron content, metabolic performance, and membrane stability of hepatic mitochondria obtained from iron-loaded and dietary anemic male Wistar rats were investigated *in vivo* to determine the effect of alterations of the steady state concentration of iron on the tissue levels of heme and on the metabolic integrity of mitochondria. Iron overload was achieved by injecting i.p. 50 mg iron, 3 times over a 6-day period, while rats were rendered anemic on a complete diet with low (7 ppm) iron content until they were 6 months old. The hepatic iron content ranged from anemic (67%) to normal (100%) to iron-loaded rats (158%). The iron content of liver mitochondria differed by more than one order of magnitude between mitochondria from normal or anemic rats, and mitochondria from iron-loaded rats. In normal mitochondria, there were 3.1 ng atoms iron/mg protein, about 30% of which was heme iron. The content of nonheme iron in liver mitochondria from iron loaded rats was increased from approximately 2 to 31 ng atoms iron/mg protein. This higher level of nonheme iron decreased the respiratory control with pyruvate-malate, but not with 3-hydroxybutyrate or succinate as substrates, and it had no effect on the capacity for phosphorylation and substrate oxidation. Iron-loaded mitochondria malondialdehyde (MDA) levels were about 3 times higher (0.35 nmole/mg protein) than that of control mitochondria, even after repeated washing with bovine serum albumin and EDTA. This suggests that iron is bound inside the mitochondria, to an extent which is 5 times higher than the maximal high affinity binding found *in vitro*. The significant amounts of MDA are indicative of a considerable degree of mitochondria lipid peroxidation.

3153 THE INFLUENCE OF DEHYDROCHOLATE ON HEPATIC UPTAKE AND BILIARY EXCRETION OF ^{3}H-TAUROCHOLATE AND ^{3}H-OUABAIN.

(Eng.) Meijer, D. K. F.; Vonk, R. J.; Scholtens, E. J.; Levine, W. G. (Dept. Pharmacology, State Univ. Groningen, Bloemsingel 1, Groningen, Netherlands). *Drug Metab. Dispos.* 4(1):1-7; 1976.

The hepatic uptake and biliary excretion of ^{3}H-taurocholate and ^{3}H-ouabain was studied in male Wistar rats during saline (control) and constant i.v. dehydrocholate infusions. Dehydrocholate (140 μmol/hr, 25 mg/ml, and 2.3 ml/hr, resp.) did not influence the plasma disappearance or the biliary excretion of taurocholate after a single i.v. injection (37 μmol/kg). Bile production in the dehydrocholate experiment was increased two to threefold compared with controls. The biliary transport maximum for exogenously administered taurocholate was determined by constant infusion to be 135.0 ± 3.0 μmol/hr (22 μmol/min/g of liver). Concomitant infusions of 140 μmol of dehydrocholate per hour did not alter the maximal taurocholate output. The effects of the two bile salts on bile flow were additive. Dehydrocholate (140 μmol/hr) reduced the biliary excretion of ^{3}H-ouabain (0.8 μmol/kg, i.v.) and elevated the secondary slow component of the plasma disappearance of the cardiac glycoside. The hepatic levels of ouabain were increased compared with controls. It is concluded that dehydrocholate interferes with ouabain transport at the canalicular level but not with primary hepatic uptake. Taurocholate (140 μmol/hr) failed to influence the total biliary output of ouabain. These differences and the lack of interaction between dehydrocholate and taurocholate suggest a hepatic transporting pathway for taurocholate that differs from that for dehydrocholate and/or its metabolites.

3154 THE INFLUENCE OF [^{3}H]TAUROCHOLATE ON THE BILIARY EXCRETION OF [^{14}C]ACETYLPROCAINE AMIDE ETHOBROMIDE.

(Eng.) Kuo, S. H.; Johnson, G. E. (645 Keolu Drive, Kailua, HI 96734). *Can. J. Physiol. Pharmacol.* 53(5):888-894; 1975.

The biliary excretion rates of [^{14}C]acetylprocaine amide ethobromide (acetyl-PAEB) and [^{3}H]taurocholate, either administered alone or in combination to adult male Wistar rats, were studied. Their renal pedicles were ligated, and the common bile duct and one jugular vein were cannulated. Acetyl-PAEB (20 mg/kg) and sodium taurocholate (70 mg/kg) were infused through the jugular vein over a 5-min period. Blood and bile samples were collected every 10 min for 60 min. Liver samples were taken at 10 and 20 min. Approximately 100% of the administered taurocholate was excreted within 50 min. The simultaneous administration of acetyl-PAEB did not significantly alter the taurocholate excretion. The amount of the acetyl-PAEB dose excreted in 1 hr was 9.4%. This was increased significantly to 16.5% when taurocholate was given concomitantly. The concentration of acetyl-PAEB in the bile increased significantly 20 min after taurocholate was given (from 391.4 ± 48.0 μg/ml to 1,411 ± 160 μg/ml; $p<0.001$). The ratios of its concentrations in bile-liver and bile-plasma were also increased, but these increases were not statistically significant. Taurocholate did not alter the liver-plasma concentration ratio of acetyl-PAEB. It is suggested that the concomitant administration of taurocholate increased the biliary excretion of acetyl-PAEB by facilitating its secretion by the liver into the bile.

3155 METABOLIC INTERACTION OF ETHANOL AND ALPRENOLOL IN ISOLATED LIVER CELLS.

(Eng.) Grundin, R. (Dept. Forensic Medicine, Karolinska Institutet, S-104 01 Stockholm 60, Sweden). *Acta Pharmacol. Toxicol. (Kbh.)* 37(3):185-200; 1975.

The metabolic interaction of ethanol and alprenolol in isolated Sprague-Dawley rat liver cells was investigated. Alprenolol (0.1 mM) was incubated with isolated rat liver cells suspended to a concentration of 3 x 10^6 cells/ml at increasing concentrations of ethanol (0-40 mM). Inhibition occurred even at low concentrations of ethanol, in a concentration range found *in vivo* during acute intoxication. Ethanol exerted a more pronounced inhibitory effect on alprenolol metabolism, but at concentrations of below 4 mM, an initial slight stimulation of alprenolol metabolism was observed. Ethanol metabolism proceeded at a rate of 13 nmol/min/10^6 cells at a saturation level of ADH. The addition of low concentrations of 4-CH3-pyrazole, a potent inhibitor of alcohol dehydrogenase, caused a marked inhibition of ethanol disappearance in isolated liver cells; almost complete inhibition occurred at 1 mM. Ethanol metabolism in the isolated liver cells was dependent upon cellular reduction level in that the rate of ethanol oxidation at low ethanol concentrations was stimulated approximately 50% by the addition of 250 μM menadion which acted as an endogenous electron acceptor. Ethanol metabolism was also inhibited by pre-incubation of the cells with 10 μM rotenone. Addition of low concentrations of alprenolol (100 μM) or propranolol (100 μM) to incubations of ethanol with isolated liver cells markedly stimulated ethanol disappearance. Hexobarbital (400 μM) also caused stimulation of ethanol metabolism. The results indicate that during simultaneous metabolism of ethanol and alprenolol, at low concentrations of ethanol, electrons can be diverted from the greatly reduced NADH/NAD+ couple by the microsomal mono-oxygenase reaction.

3156 HEPATIC MICROSOMAL ALCOHOL-OXIDIZING SYSTEM IN NORMAL AND ACATALASEMIC MICE: ITS DISSOCIATION FROM THE PEROXIDATIC ACTIVITY OF CATALASE-H_2O_2.

(Eng.) Teschke, R.; Hasumura, Y.; Lieber, C. S. (Veterans Admin. Hosp., Bronx, NY 10468). *Mol. Pharmacol.* 11(6):841-849; 1975.

Various primary alcohols were incubated with hepatic microsomes of both normal (Cs^a) and acatalasemic mice (Cs^b) to assess whether catalase-H_2O_2 is an obligatory component in the microsomal alcohol-oxidizing system. In the presence of an NADPH-generating system washed microsomes (5.0 mg protein) were incubated with 100 mM methanol or 50 mM ethanol, propanol, butanol, or pentanol in phosphate buffer for 5 min before starting the reaction with the NADPH-generating system. These alcohols were metabolized at striking rates by microsomes of both strains (4.9-13.0 nM aldehyde/min/mg microsomal protein for normal mice and 5.13-13.4 nM/min/mg in acatalasemic mice). By contrast, when the NADPH-generating system was replaced by a H_2O_2-producing one, propanol, butanol, and pentanol were not metabolized, indicating that these higher aliphatic alcohols are not substrates for catalase-H_2O_2. Furthermore, mild heat treatment (37 C, 60 min) of microsomes of acatalasemic mice resulted in inactivation of contaminating catalase and virtually abolished alcohol peroxidation of methanol and ethanol by catalase-H_2O_2, whereas the rates of the NADPH-mediated alcohol oxidation by the microsomal fraction persisted with methanol, ethanol, propanol, butanol, and pentanol as substrates. In addition, the microsomal alcohol-oxidizing system of both normal and acatalasemic mice was solubilized and isolated from catalase by DEAE-cellulose column chromatography. These findings dissociate the NADPH-dependent microsomal alcohol-oxidizing system from alcohol peroxidation via catalase-H_2O_2 by difference in substrate specificity and rule out an obligatory involvement of catalase-H_2O_2 in the microsomal system.

3157 MINIMAL HEPATIC CHANGES IN RATS FED ALCOHOL AND A HIGH CASEIN DIET. (Eng.) Patek, A. J., Jr.; Bowry, S. C.; Sabesin, S. M. (Veterans Admin. Hosp., 150 S. Huntington Ave., Boston, MA 02130). *Arch. Pathol. Lab. Med.* 100(1):19-24; 1976.

The effects of prolonged ingestion of alcohol in combination with a nutritious diet on production of hepatic cirrhosis were studied in rats. Thirty-one male Wistar rats were fed a high protein (25%) liquid diet in which alcohol comprised 35.5% of the total calories. Rats maintained on this diet for 19 months had normal growth when compared to 30 rats maintained on chow and water. There was no evidence of cirrhosis after 19 months. Histological examination showed no hepatocellular necrosis, inflammation, or increased connective tissue. Ultrastructural study showed no substantial changes, except for occasional mitochondrial enlargement in cells containing increased lipid. Biochemical analyses at 19 months showed moderate increase in hepatic triglyceride levels and a slight increase in hepatic collagen content in the experimental groups. It is suggested that a nutritious diet may protect against the effects of alcohol.

3158 ALCOHOLIC HEPATOMEGALY: ACCUMULATION OF PROTEIN IN THE LIVER. (Eng.) Baraona, E.; Leo, M. A.; Borowsky, S. A.; Lieber, C. S. (Veterans Admin. Hosp., Bronx, NY 10468). *Science* 190(4216): 794-795; 1975.

The contribution of cell constituents other than fat to ethanol-induced hepatomegaly was investigated. The livers of 24 rats, which were fed a diet containing 36% ethanol for 4-8 weeks increased 30% in both volume and wet weight in comparison with paired littermates, which were fed no ethanol. The increase in liver fat (151 ± 29 mg/100 g body weight) accountec for only half of the increase in liver dry weight (304 ± 40 mg/100 g), and an increase in protein (132 ± 41 mg/100 g) accounted for almost the whole other half. Hepatic protein concentration did not change, indicating that water also increased proportionally. DNA content of the liver remained unchanged, suggesting that hepatomegaly was due to an increase in cell size rather than to increased cell number. The main protein increase occurred in the cytosolic fraction. Increases in hepatic albumin and transferrin concentrations suggest that intrahepatic deposition of export proteins may contribute to this increase in soluble protein and that the feeding of ethanol may decrease the ability of the liver to export proteins.

3159 PROTECTIVE ACTION OF CARNITINE ON LIVER LIPID METABOLISM AFTER ETHANOL ADMINISTRATION IN RATS. (Eng.) Hosein, E. A.; Bexton, B. (Dept. Biochemistry, McGill Univ., Montreal, Quebec H3G 1Y6, Canada). *Biochem. Pharmacol.* 24(20): 1859-1863; 1975.

The capacity of carnitine to restore metabolic balance from that previously altered by ethanol administration was investigated in Sprague-Dawley rats. Two injections of ethanol (4 g/kg, i.p.) produced a significant increase in colonic temperatur 18 hr after administration. Carnitine (0.5 mg/g) did not significantly lower this temperature. Carnitine produced significant protection against increases in SGOT levels in animals receiving ethanol. In animals starved for 2 days, no changes in SGOT levels were observed, but there was an increase in hepatic lipids, indicating that the increase in SGOT, caused by alcohol, is not related to an increase in hepatic lipids. Carnitine (0.1 mg/g) significantly lowered blood triglycerides, but this action occurred with both normal rats and rats receiving alcohol. Higher amounts of carnitine (0.5 mg/g) produced a significan decrease in the liver triglycerides; this was more marked in animals, which received ethanol than in control rats. Similarly, carnitine showed a significant lipotropic action, which was reflected by a diminution of total lipid content in liver; this was also more marked in animals which received ethanol than in controls. The results suggest that carnitine may stimulate metabolism in ethanol-altered mitochondrial membranes.

3160 NORADRENERGIC SUBSENSITIVITY OF RAT LIVER HOMOGENATES DURING CHRONIC ETHANOL INGESTION. (Eng.) French, S. W.; Palmer, D. S.; Narod, M. E. (Dept. Pathology, Univ. British Columbia, Vancouver, V6T1W5, Canada). *Res. Commun. Chem. Pathol. Pharmacol.* 13(2):283-295; 1976.

The cAMP response of liver homogenates of male Wistar rats to norepinephrine (NE) was measured to determine whether noradrenergic receptors in a visceral organ are affected by ethanol feeding. The cAMP response was inhibited after chronic ethanol ingestion (14-17 g/kg/day for 2 weeks) with low (3 x 10^{-5} and 10^{-4} M) concentrations of NE. There was no difference between the ethanol-fed and control values at high concentrations (3×10^{-4}). When the geometric mean ED_{50}'s were calculated, a significant ($p<0.001$) shift to the right of the dose response curve was found. After 3 days of ethanol withdrawal, the cAMP response returned to control levels. The cAMP response of the crude (CM) and purified (PM) mitochondrial fractions was comparable. Addition of NE (10^{-4} M) doubled the cAMP in both CM ($p<0.003$) and PM ($p<0.005$). Phenoxybenzamine (10^{-4} M) did not block the cAMP response of either fraction. Propranolol (10^{-4} M, dl-) inhibited the response of both fractions ($p<0.005$), and chlorpromazine (10^{-5} M) inhibited the response of CM. Practolol (10^{-4} M) also inhibited the response of PM ($p<0.05$). The cAMP response of CM to NaF (10^{-2} M), histamine (10^{-4} M), isoproterenol (10^{-5} M), L-epinephrine (10^{-5} M), and serotonin (10^{-4} M) was significant. The results of the chronic ethanol feeding experiment indicate that NE receptors of the liver become subsensitive just as brain slices did in prior studies.

3161
PROLIFERATION OF ENDOTHELIAL CELLS IN ESTROGEN-STIMULATED RAT LIVER. A LIGHT AND ELECTRON MICROSCOPIC CYTOCHEMICAL STUDY. (Eng.)

Widmann, J.-J.; Fahimi, H. D. (Harvard Medical Sch., Boston, MA). *Lab. Invest.* 34(2):141-149; 1976.

The mononuclear phagocytes (Kupffer cells) were used as cellular markers to determine the effects of an estrogen upon the mitotic activity and the ultrastructure of individual types of littoral cells in the liver of female Charles River rats. The rats received a single 10-mg injection of diethylstilbesterol, and at daily intervals up to 6 days their livers were fixed by perfusion and processed for localization of peroxidase. Mitotic figures were rare in untreated control animals, but dividing littoral cells with both positive and negative peroxidase reaction were identified. The exclusive reaction identified the Kupffer cells not only in the interphase but also during the mitotic division. In estrogen-treated animals, there was a sharp rise in the mitotic activity of littoral cells; the activity reached its peak on the third day and returned to normal levels on the sixth day after the initial injection. A breakdown of the dividing cells, on the basis of their peroxidase reactivity, revealed that nearly the entire population of dividing cells consisted of peroxidase-negative endothelial cells. In addition, numerous hyperactive Kupffer cells containing large phagolysosomes with phagocytosed peripheral blood cells and latex particles were seen. Intermediate cell-types with cytochemical features between Kupffer cells and endothelial cells or between monocytes and Kupffer cells were not encountered. Because of the limited phagocytic capacity of hepatic endothelial cells, these observations provide morphologic evidence that estrogen treatment has little or no effect upon the particle clearing function of the reticuloendothelial system in rats. The rare but clear demonstration of dividing Kupffer cells in liver sinusoids indicates that these cells are capable of self-replication *in situ*. In addition it is suggested that the estrogens may play an important role in the pathophysiology of endothelial cells.

3162
EXPERIMENTAL GALACTOSAMINE INDUCED HEPATITIS: EFFECT OF ANTICOAGULANT AND ANTIFIBRINOLYTIC AGENTS ON MICROCLOT FORMATION. (Eng.)

Muller-Berghaus, G.; Reuter, C.; Bleyl, U. (Dept. Medicine, Justus Liebig Universitat, Klinikstrasse 36, 63 Giessen, Germany). *Am. J. Pathol.* 82(2):393-406; 1976.

The effect of an antifibrinolytic agent (epsilon-aminocaproic acid, EACA) and an anticoagulant (heparin) on microclot formation in rabbits of mixed New Zealand breeds was investigated to determine the severity of liver damage. An experimental hepatitis was induced by i.v. infusion of 1 g galactosamine/kg body weight. This caused major pathological changes in the livers of 9 out of 10 animals. Galactosamine also triggered formation of glomerular microclots in 2 out of 10 rabbits and numerous microclots in the interalveolar capillaries of 3 out of 10 rabbits. The infusion of 0.5 g EACA/kg/hr caused the formation of microclots in the renal glomerular capillaries of 9 out of 12 rabbits and in the lungs of 3 animals. The microclots exhibited typical staining characteristics like those observed in the generalized Shwartzman reaction. Some animals developed bilateral renal cortical necrosis. Animals treated with 1500 U/kg heparin, immediately before galactosamine and EACA or with a continuous infusion (750 U/kg/hr) after galactosamine did not develop any microclots in either the renal glomerular capillaries or in the liver. A few microclots were seen in the lungs and the spleen. Increases in SGOT and bilirubin levels were similar in heparin-treated and untreated rabbits. The results indicate that disseminated intravascular coagulation is involved in galactosamine-induced hepatitis but that it does not contribute to the severity of the liver injury.

3163
EFFECT OF LIPOSOMAL ENTRAPMENT ON THE PROTECTIVE ACTION OF GLUTATHIONE AGAINST PARACETAMOL-INDUCED LIVER NECROSIS [Abstract]. (Eng.)

Malnoe, A.; Louis, A.; Benedetti, M. S.; Schneider, M.; Smith, R. L.; Kreber, L.; Lam, R. (Battelle, Geneva Res. Centre, 7 Route de Drize, 1227 Carouge/Geneva, Switzerland). *Biochem. Soc. Trans.* 3(5):730-732; 1975.

The use of liposomes as carriers of agents that protect against drug-induced liver damage was studied in male Swiss albino mice using glutathione as the protective agent. Mice injected i.p. with paracetamol (500 mg/kg, i.p.) developed liver necrosis, as evidenced by a large increase in plasma aspartate aminotransferase and alanine aminotransferase. The administration of either four doses of glutathione each of 128 mg/kg at 15, 45, 75, and 105 min after paracetamol or of a single large dose (500 and 800 mg/kg) significantly protected against the hepatotoxic effects. Glutathione entrapped in liposomes was much less effective than the free drug in decreasing the hepatotoxic effects of paracetamol. The i.v. injection of entrapped glutathione in four separated doses at 15, 45, 75, and 105 min before paracetamol failed to give significant protection, indicating that the failure of encapsulated drug to produce protection was not due to its slow release from the liposome. The results suggest that entrapped glutathione fails to protect against paracetamol-induced liver damage; this may be due to the breakdown of the compound in the lysosomes after its release or to an unfavorable release pattern.

3164 CELL KINETIC STUDIES ON INTERFERENCE BETWEEN PROLIFERATIVE AND FUNCTIONAL METABOLISM IN REGENERATING RAT LIVER AFTER ADMINISTRATION OF PHENOBARBITAL.

(Ger.) Tuczek, H. V.; Skoruppa, W.; Rabes, H. M. (Pathologisches Institut der Universitat, D-8000 Munchen 2, Thalkirchnerstr. 36, W. Germany). *Virchows Arch. (Zellpathol.)* 17(4):347-361; 1975.

Studies were carried out in the regenerating livers of phenobarbital (PB)-treated rats to investigate the correlation between function and proliferation. Male adult Wistar rats received i.p. injections of 90 mg PB/kg daily for 5 days (group A). Rats in group B received additional injections of PB at a reduced dose (30 mg/kg) every 12 hr after partial hepatectomy, beginning immediately after the operation after a single injection of tritiated thymidine (^{3}H-TdR) at different intervals after surgery. The specific activity of DNA, ^{3}H-TdR labeling index, and mitotic index were determined 60 min after the ^{3}H-TdR injection. The intralobular distribution of DNA-synthesizing hepatocytes was analyzed in 22-hr regenerating liver. Stimulation of functional activities by PB resulted in a transitional synchronization of the start of DNA synthesis in liver parenchymal cells after partial hepatectomy. The labeling indices of group A and B increased to 36% and 30%, resp., as compared to 18.5% of NaCl-treated controls. Analysis of intralobular distribution of DNA-synthesizing hepatocytes revealed that higher levels of synchronization were limited to periportal zones of the liver lobule which provide optimal conditions for G_1-S transition. PB treatment apparently does not influence duration of S, G_2, or M under these conditions. The results stress the possibility that transitional synchronization of DNA synthesis by functional load might simulate stimulation of growth in a proliferating population.

3165 γ-GLUTAMYLTRANSPEPTIDASE IN THE RAT LIVER AFTER PORTACAVAL SHUNT.

(Eng.) Colombo, J. P.; Peheim, E.; Bachmann, C.; Muller, E.; Bircher, J. (Inselspital, 3010 Berne, Switzerland). *Pediatr. Res.* 10(1):18-24; 1976.

γ-Glutamyltranspeptidase (GGTP) activity was studied in livers of male SPF-Sprague-Dawley rats that were submitted to an end-to-side portacaval shunt (PCS) and in developing animals (15th gestational day to 15th postnatal day). To correlate the evolution of the enzymatic activity measured *in vitro*, histochemical techniques were used to localize enzyme activity in liver tissue. The GGTP activity in the adult rats was low (2.0 μmol/min/g). During fetal development, the enzyme activity rose beginning on the 15th gestational day from 630 ± 97 to 1,058 ± 20 μmol/min/g on the first postnatal day. The values declined and reached nearly adult values from the 10th postnatal day. After PCS, the GGTP activity exhibited a 3- to 6-fold increase (130 ± 69 to 371 ± 131 μmol/min/g) as compared with unoperated adult controls (53 ± 13 μmol/min/g). The highest levels corresponded to those observed between the third and fifth postnatal day in the developing rats. The histochemistry of GGTP in the fetal and newborn liver showed a regular distribution of the enzyme as a fine deposit in the hepatocytes throughout the whole tissue. Ten days after birth, the activity was low, at the same level as in the adult rat. In the period after PCS, hepatocytes began to show signs of enzymatic activity at the periphery of the hepatic lobules, which subsequently spread through the whole lobules. The increase of GGTP activity after PCS equaled the activity found in fetal animals. That correlated well in both groups with the reappearance of histologically demonstrable enzyme activity in hepatocytes. The increase of GGTP activity after PCS may be interpreted as a sign of functional changes leading to a reappearance of an enzyme normally present only in fetal and neonatal liver.

3166 THE EFFECT OF MASSIVE LIVER RESECTION ON PLATELET KINETICS IN THE RAT.

(Eng.) Siemensma, N. P.; Bathal, P. S.; Penington, D. G. (Dept. Medicine, Melbourne Univ., Fitzroy, 3065 Victoria, Australia). *J. Lab. Clin. Med.* 86(5):817-833; 1975.

The effect of partial hepatectomy on platelet kinetics was assessed in hooded Wistar rats. Four-fifths hepatectomy resulted in thrombocytopenia, reaching 50% of control platelet counts on the fifth postoperative day. Platelets accumulated in the sinusoids of the liver remnant after partial hepatectomy. During the first 2 postoperative days, 50% of platelets disappeared from the blood. After this, platelet numbers fell slowly for an additional 3 days, and was followed by recovery. Neither ^{51}chromium-labeled platelet survival nor total organ pooling of platelets varied from the normal after four-fifths hepatectomy. Although platelets accumulated in the liver remnant, the numbers involved did not contribute significantly to the thrombocytopenia. The mechanism responsible for the thrombocytopenia was suppression of entry of platelets into the peripheral blood. The observed effect was specific for platelets; erythropoiesis was not suppressed. Megakaryocytes showed a decrease in average diameter and ploidy value, a change seen also after physiologic suppression of platelet production; these findings suggest that the liver is concerned in the elaboration of thrombopoietin. However, as four-fifths hepatectomy results in immediate cessation of entry of platelets into the peripheral circulation, a phase of platelet production in which the principal physiologic regulator has been considered to have no effect, a second mechanism must be invoked, affecting the final step of platelet production.

3167 EFFECTS OF ROUTE OF ADMINISTRATION AND BLOOD FLOW ON HEPATIC DRUG ELIMINATION.

(Eng.) Shand, D. G.; Kornhauser, D. M.; Wilkinson, G. R. (Vanderbilt Univ. Sch. Medicine, Nashville, TN 37232). *J. Pharmacol. Exp. Ther.* 195(3):424-432; 1975.

The effects of route of administration and blood flow on the elimination of lidocaine, diphenylhydantoin, and propranolol were investigated in the isolated perfused Sprague-Dawley rat liver. After administration directly into the portal vein, drug concentrations in the reservoir were the same at a given flow rate as concentrations in the hepatic vein after drug was placed directly into the reservoir. The apparent clearance of the drug, calculated from these concentrations, gave an estimate of intrinsic drug clearance, which is an estimate of the activity of the drug-metabolizing enzymes. Intrinsic clearance is defined as drug clearance when flow is not rate limiting and therefore should be independent of flow. This was confirmed by showing that, at steady state, neither hepatic venous drug concentrations nor concentrations in the reservoir after portal venous administration of lidocaine (58 μg/min) were affected by altering hepatic blood flow from 10 to 20 ml/min. Propranolol was given as a single 1-mg dose into the reservoir at flows of 10 and 20 ml/min. The area under the concentration-time curve (AUC) in the reservoir was decreased by increased flow, but AUC for hepatic venous blood was unchanged. Although AUC in hepatic venous blood was unchanged, higher peak concentrations and a more rapid half-life were seen. These data suggest that after p.o. drug administration, steady-state concentrations or AUC in systemic blood is dependent upon only the activity of the enzymes involved (i.e., intrinsic clearance) and is unaffected by flow, provided that the drug is completely absorbed and eliminated only by the liver. Furthermore, this applies even to drugs whose systemic clearance and drug half-life after i.v. administration is profoundly affected by altered hepatic blood flow.

3168 STUDIES ON THE FUNCTION OF CELL MEMBRANE. 10TH REPORT: EFFECTS OF CCl_4 ON THE MARKER ENZYME ACTIVITIES AND FINE STRUCTURES OF RAT LIVER PLASMA MEMBRANES AND MICROSOMES IN VITRO. (Eng.) Masuda, Y.; Yano, I.; Sumida, S.; Murano, T. (Wakayama Medical Coll., Wakayama, Japan). *Jpn. J. Pharmacol.* 25(2):151-160; 1975.

3169 PHARMACOLOGIC CONTROL OF POSTHEPATECTOMY PORTAL HYPERTENSION. (Eng.) Sirinek, K. R.; Thomford, N. R. (Ohio State Univ. Coll. Medicine, Columbus, OH). *Surg. Forum* 24:391-393; 1973.

3170 FAILURE OF PERFUSATE PASSED THROUGH REGENERATING LIVER TO INCREASE DNA SYNTHESIS IN CELLS OF ISOLATED PERFUSED NORMAL LIVER. (Eng.) Sera, Y.; Neustein, H.; Nicholson, M. O.; McLeod, J.; Hays, D. M. (Children's Hosp. Los Angeles, CA). *Surg. Forum* 24:386-387; 1973.

3171 HEPATIC REGENERATION IN THE RAT WITHOUT PORTAL ORGANS. (Eng.) Whittemore, A. D.; Kasuya, M.; Fodor, P. B.; Price, J. B., Jr.; Voorhees, A. B., Jr. (Coll. Physicians Surgeons, Columbia Univ., New York, NY). *Surg. Forum* 24: 384-385; 1973.

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3173 EFFECT OF LONG-TERM ADMINISTRATION OF DIFFERENT HARD LIQUORS AND RED WINE ON THE RAT LIVER: A HISTOLOGICAL AND BIOCHEMICAL STUDY. (Eng.) Jordo, L.; Olsson, R. (Sahlgrenska sjukhuset, Univ. Goteborg, S-413-35 Goteborg, Sweden). *Acta Pathol. Microbiol. Scand. [A]* 83(4):345-354; 1975.

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3175 STARVATION AND PHENOBARBITAL TREATMENT EFFECTS ON DRUG HYDROXYLATION AND GLUCURONIDATION IN THE RAT LIVER AND SMALL INTESTINAL MUCOSA. (Eng.) Marselos, M.; Laitinen, M. (Dept. Physiology, Univ. Kuopio, SF-70101 Kuopio 10, Finland). *Biochem. Pharmacol.* 24(16):1529-1535; 1975.

3176 GLYCOGEN SYNTHESIS IN THE PERFUSED LIVER OF STREPTOZOTOCIN-DIABETIC RATS. (Eng.) Whitton, P. D.; Hems, D. A. (Imperial Coll. Science and Technology, London SW7 2AZ, U.K.). *Biochem. J.* 150(2):153-165; 1975.

3177 A COMPARATIVE STUDY ON IN VIVO PROTEIN SYNTHESIS BY LIVER OF PREGNANT AND NON-PREGNANT MICE. (Eng.) Tarachand, U.; Eapen, J. (Bhabha Atomic Res. Center, Bombay 400 085, India). *Horm. Metab. Res.* 6(6):491-493; 1974.

3178 ALIMENTARY PRODUCTION OF GALLSTONES IN HAMSTERS: 28. INFLUENCE OF ISOMERIZED SQUALENE ON GALLSTONE PRODUCTION. (Eng.) Sondergaard, E.; Prange, I.; Dam, H. (Dept. Biochemistry, Polytechnic Inst., Copenhagen, Denmark). *Z. Ernahrungswiss.* 13(4):237-240; 1974.

3179 ARE CELLS IN LIVER TISSUE RELEVANT TO IMMUNOLOGY? (Eng.) Garvey, J. S. (Biology Res. Lab., Syracuse Univ., Syracuse, NY 13210). *Immunochemistry* 12(6/7):637-640; 1975.

3180 ENHANCED IN VITRO HEPATIC GLUCURONIDATION OF THYROXINE IN RATS FOLLOWING CUTANEOUS APPLICATION OR INGESTION OF POLYCHLORINATED BIPHENYLS. (Eng.) Bastomsky, C. H.; Murthy, P. V. N. (Royal Victoria Hosp., Montreal, Quebec, H3A 1A1, Canada). *Can. J. Physiol. Pharmacol.* 54(1):25-26; 1976.

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3186 STUDIES ON THE INHIBITION OF HEPATIC LIPOGENESIS BY N^6,O^2-DIBUTYRYL ADENOSINE 3',5'-MONOPHOSPHATE. (Eng.) Harris, R. A. (Indiana Univ. Sch. Medicine, Indianapolis, IN). *Arch. Biochem. Biophys.* 169(1):168-180; 1975.

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3189 ALIMENTARY PRODUCTION OF GALLSTONES IN HAMSTERS. 27. INFLUENCE OF SUPPLEMENTATION OF THE GALLSTONE PRODUCING DIET WITH SQUALENE, CHOLESTEROL, CERTAIN OTHER STEROLS, FISH OIL FATTY ACID ETHYL ESTERS, AND MODIFICATION OF THE BASAL DIET ON GALLSTONE PRODUCTION AND LEVELS OF CHOLESTEROL IN SERUM AND LIVER. (Eng.) Dam, H.; Prange, I.; Sondergaard, E. (Danmarks Tekniske Hojskole, Oster Voldegade 10 L, DK-1350 Kobenhaun, Danmark). *Z. Ernaehrungswiss.* 13(4):208-236; 1974.

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3211 EFFECTS OF DEXTRAN AND POLYVINYLPYRROLIDONE ON THE BEHAVIOR OF ACID HYDROLASES OF RAT LIVER. (Ita.) Gaudiano, A.; Petti, G.; Polizzi, M.; Broch, E.; Bucci, M.; Gilardi, G.; Sami, G.; Sanzini, E. (No affiliation given). *Ann. Ist. Super. Sanita* 10(1/2):35-42; 1974.

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3217 ACTION OF THE MICROBIAL FLORA AND OF DIET ON THE INTESTINAL "POOL" AND ON FECAL EXCRETION OF BILE SALTS IN THE RAT. (Fre.) Sacquet, E.; Mejean, C.; Leprince, C.; Riottot, M. (Laboratoire des Animaux sans Germes, CNRS, CNRZ, 78350 Jouy-en-Josas, France). *C. R. Acad. Sci.* [*D*] *(Paris)* 281(18):1337-1339; 1975.

See also, 3072, 3137, 3244.

SECRETION AND METABOLISM

Intestine

3218 EVIDENCE FOR BOTH LUMINAL AND SYSTEMIC FACTORS IN THE CONTROL OF RAT INTESTINAL EPITHELIAL REPLACEMENT. (Eng.) Clarke, R. M. (Univ. Hosp. Medical Sch., Nottingham NG7 2UH, England). *Clin. Sci. Mol. Med.* 50(2):139-144; 1976.

The effect of luminal and systemic factors on the control of intestinal epithelial replacement was investigated in male albino Wistar rats. One group of rats underwent the surgical isolation of a sac of upper small intestine, while in another group, a similar sac was created but a plastic infusion tube was implanted to admit fluid. Some rats were starved for 48 hr, while others were fed. The isolation of the sac did not significantly change villus height, crypt depth, or crypt/villus ratio in the fed animal, although it did cause a reduction in colchicine metaphase accumulation rate in the sac ($p<0.001$). Starving caused a further halving of cell production rate in the sac and a reduction in colchicine metaphase accumulation rate, both in the sac and in the terminal ileum of the intestine-in-continuity ($p<0.005$). Infusion of distilled water into isolated sacs for 72 hr caused a similar degree of stimulation of cell production in sacs, both in fed and starved rats. This confirms the importance of luminal factors in the regulation of epithelial cell production, as shown by the effects of isolation of a sac of intestine, and of infusion of distilled water. However, the reduction in cell production, which occurs when an animal bearing an isolated sac is starved, indicates that systemic factors cannot be ignored.

3219 DISACCHARIDASES IN RAT SMALL INTESTINAL MUCOSA FOLLOWING CYTOSTATIC TREATMENT WITH ADRIAMYCIN. (Eng.) Hartwich, G.; Domschke, W.; Matzkies, F.; Pesch, H.-J. (Med. Klinik u. Poliklinik, Universitat Erlangen-Nurnberg, D-8520 Erlangen, Krankenhausstrasse 12, Erlangen, W. Germany). *Res. Exp. Med.* 166(1):23-34; 1975.

The effects of cytostatic treatment with various i.p. doses of adriamycin on the disaccharidase activity of the small intestinal mucosa was investigated in SPF-Wistar rats. For each series of experiments, 60 rats received three i.p. shots of varying doses of adriamycin (1 x 3 mg/kg, 3 x 1 mg/kg at intervals of 24 hr, and 1 x 9 mg/kg). The rats manifested no macroscopic changes after doses of 1 x 3 mg/kg and 3 x 1 mg/kg. There was a marked reduction in vitality 48 hr following a 1 x 9 mg/kg dose, and 20 animals died within 120 hr. This dose also produced marked inflammatory changes in the intestine. There were marked histological changes at 24 hr in the nuclei and cytoplasm of the epithelia of the regenerative zone in the bottom of the crypts. At 3 days, many villi were transformed into swollen and flattened bumps in the mucosa. At 5-6 days, the villi regained their original slender profile. At 48 hr after administration of 1 x 9 mg/kg, all disaccharidase activities were reduced and after 72 hr, they were reduced by a statistically significant degree ($p<0.01$). After 24 hr, the sucrase and maltase activities in the jejunal mucosa manifested a slight insignificant elevation, and subsequently, they were clearly depressed. The lowest values were found after 72 and 96 hr. Following this, all the values increased again, but even after 7 days they had not re-attained their initial values. After low doses of adriamycin, the intestinal disaccharidase activities were depressed for a very long period of time. It appears that the reactivity-accelerated cell division, after cytostatic therapy, initially produces morphologically intact, but functionally immature, epithelia.

3220 DEMONSTRATION OF TWO DIFFERENT VITAMIN D-DEPENDENT CALCIUM-BINDING PROTEINS IN RAT INTESTINAL MUCOSA. (Eng.) Moriuchi, S.; Yamanouchi, T.; Hosoya, N. (Faculty Medicine, Tokyo Univ., 7-3-1, Hongo, Bunkyo-ku, Tokyo 113, Japan). *J. Nutr. Sci. Vitaminol. (Tokyo)* 21(4):251-259; 1975.

The characteristics and location of rat intestinal proteins with calcium binding properties were examined in female Wistar rats using both a ^{45}Ca-equilibrated Sephadex G-100 column and the chelex 100 method in the assay of ^{45}Ca binding activity. Cytosol from the small intestine mucosa of vitamin D-deficient rats was fractionated on a ^{45}Ca-equilibrated Sephadex G-100 column. Three ^{45}Ca binding peaks (BP) were formed. Peak I eluted at void volume. The elution volume (Ve) to void volume (Vo) ratio for peak II was 1.84 and for peak III, Ve/Vo=2.47. Peak I was identical with the ^{45}Ca binding peak obtained from vitamin D-deficient cytosol. The Ca binding activity was different in various parts of small intestine. Duodenal supernatants demonstrated a high activity in peak III area, while peak II activity was negligible. In the jejunum, peak II activity increased, while peak III decreased, so that their levels were almost equal. The ^{45}Ca binding activity of ileum was generally very low. Results obtained using the chelex 100 assay were different from those obtained by the Sephadex gel filtration method. The major difference was in peak II activity, which was found to be extremely low. These studies demonstrate the existence of at least three different Ca binding proteins and of a vitamin D-dependent Ca binding protein of molecular weight of 12,500 found mainly in the duodenum.

3221 MECHANISMS OF DISPOSAL OF ACID AND ALKALI IN RABBIT DUODENUM. (Eng.) Fiddian-Green, R. G.; Silen, W. (Harvard Medical Sch., Boston, MA 02215). *Am. J. Physiol.* 229(6):1641-1648; 1975.

Mechanisms by which the duodenal mucosa disposes of acid and alkali were studied in New Zealand rabbits. Stripped duodenal mucosa was mounted in Ussing chambers containing a Ringer solution gassed with 100% O_2. The disappearance of acid or alkali from the mucosal solution of short-circuited tissue was measured with a pH stat while the serosal pH was kept at 7.4. The duodenum rapidly disposed of both acid and alkali; neither property was altered by gassing with N_2 while iodoacetate was in the perfusing solutions. Prevention of release of CO_2 from the mucosal chamber obliterated the early rapid phase of acid disposal by the mucosa, while a similar maneuver in the serosal chamber increased the appearance of serosal acid without altering the rate of acid disposal. Gut sacs of duodenum *in vitro* and *in vivo* showed a positive correlation between acid disposal and the rate of luminal CO_2 production. While acid disposal progressively decreased with time for the *in vitro* gut sacs, the *in vivo* gut sac showed no fatigue in this respect. Luminal acidification in the Ussing chamber was associated with a profound reduction in short-circuit current, partially reversible by elevation of the mucosal pH but not by luminal glucose (5 mM). These data suggest that acid disposal occurs, in part, by intraluminal neutralization and, in part, by diffusion into the mucosa.

3222 NORMAL SERUM ALBUMIN TRANSFER FROM BLOOD TO SMALL INTESTINE AND ITS ROLE IN ALBUMIN BREAKDOWN. (Eng.) Herczeg, B. (1134 Budapest Robert Karoly krt. 82-84 Korhaz, Sebeszet, Hungary). *Acta Chir. Acad. Sci. Hung.* 16(1):13-25; 1975.

^{131}I-albumin transfer into isolated segments of the small intestine was determined following the i.v. injection of 100 μCi of human ^{131}I-albumin in 23 dogs. The importance of different intestinal segments in the normal degradation of albumin was established. The slope of the serum disappearance curve was unaltered, indicating that the applied technique had no damaging effect. Albumin leakage was not uniform in the whole length of the small intestine. It was highest in the duodenum (0.241 ml/10 cm intestine/hr). This was followed by the jejunum (0.142 ml/10 cm intestine/hr), and the smallest value was found in the ileum (0.082 ml/10 cm intestine/hr). The daily quantity of albumin leakage corresponded to a plasma volume of 14.49 ml in the duodenum, 27.16 ml in the jejunum, and to 23.76 ml in the ileum. The relation of albumin leakage and catabolism revealed that protein bound activity (transferred and regained) in the duodenum, in spite of this short section of the intestine, was responsible for 11.72 ± 1.70% of total catabolism, that in the jejunum for 21.28 ± 3.69%, and that in the ileum for 19.24 ± 3.64%. The sum of the catabolism of the three intestinal segments yielded 52.26 ± 6.65% of the total catabolism. After correction with a proteolytic factor, this value was 68.44%. These studies indicate that the small intestine is the main region of normal albumin breakdown.

3223 SEX VARIATION IN THE ACTIVITIES OF MUCOSAL HYDROLYTIC ENZYMES IN THE SMALL INTESTINE OF THE RAT. (Eng.) Hietanen, E. (Univ. Kuopio, P.O. Box 138, SF-70101 Kuopio 10, Finland). *Digestion* 13(1/2):33-41; 1975.

The mucosal response of alkaline phosphatase, ATPase, and disaccharidase (lactase, maltase, and trehalase) activities to sex hormones was studied by comparing male and female Wistar rats and castrated male rats. Castrated males were given testosterone propionate in propylene glycol (100 μl) i.p. every 48 hr for 10 days prior to sacrifice. Homogenates were prepared from mucosa scraped from three sections of the small intestine. Alkaline phosphatase showed a very steep gradient in the small intestine from the oral to the aboral end, while ATPase activity in the ileum was still about 50% of that in the duodenum. Both enzymes showed only minor sex variations and weak responses to castration. Lactase and maltase had peak activities in the jejunum, but trehalase activity was nearly equally as high in the duodenal mucosa as in the jejunum. In the jejunal mucosa, maltase activity was significantly ($p<0.05$) higher in male than in female rats. Castration did not markedly decrease activity, and a moderate increase followed testosterone administration. Lactase had much higher activity in the jejunum than in other sections. The female rats had only about 50% of the jejunal lactase activity found in males. The castration of males decreased activity ($p<0.01$) to the feminine pattern. Testosterone did not enhance it within 10 days. In the duodenal mucosa, the female rats had lower ($p<0.01$) activity than males, and also duodenal and jejunal activities ($p<0.05$) lower than males. Castration had no effect, but the administration of testosterone to castrated males significantly enhanced activity in the duodenum ($p<0.01$) and slightly in the jejunal mucosa. The data suggest marked species differences in adaptation of intestinal mucosa to environmental and hormonal factors.

3224 SUBSTRATE-INDUCED ACCELERATION OF LACTASE SYNTHESIS IN FETAL RAT INTESTINE.

(Eng.) Lifrak, I. L.; Lev, R.; Loud, A. V. (New York Medical Coll., Valhalla, NY). *Pediatr. Res.* 10(2):100-102; 1976.

Attempts were made to accelerate intestinal lactase synthesis in the fetal rat. Lactose (20 mg) was injected into the amniotic sacs of fetuses in one uterine horn, and 20 mg of glucose was injected into the amniotic sacs of fetuses in the opposite uterine horn of six rats on days 17 through 19 of pregnancy. Two or 3 days later, the pregnant animals were killed, and segments of jejunum, obtained from their fetuses, were homogenized in water and assayed for lactase. Lactase values were significantly higher ($p<0.005$) in the lactose-injected group than in fetuses receiving glucose. These values were 1.81 μM glucose/min/mg protein in fetuses injected with lactose, and 0.85 μM in the animals given glucose. Thus, fetal intestinal lactase activity can be increased by exposure to the substrate lactose during late fetal life.

3225 INTESTINAL METABOLISM OF GLUTAMINE AND GLUTAMATE FROM THE LUMEN AS COMPARED TO GLUTAMINE FROM BLOOD.

(Eng.) Windmueller, H. G.; Spaeth, A. E. (Natl. Inst. Arthritis, Metabolism, Digestive Diseases, Natl. Insts. Health, Bethesda, MD 20014). *Arch. Biochem. Biophys.* 171(2):662-672; 1975.

An *in situ* preparation of rat jejunum was studied to determine metabolites produced from glutamine and glutamate absorbed in the intestine and to quantitate separately the metabolic rates of lumen-derived and blood-derived glutamine. Only a small fraction of the 6 mM L-[U-^{14}C]glutamate (2%) and the L-[U-^{14}C] glutamine (34%) administered into the lumen of Osborne-Mendel rat jejunal segments *in situ* was recovered unchanged in venous blood collected from the segments. The remaining ^{14}C of both amino acids was recovered in the blood as CO_2 (60%), proline (5%), citrulline (4%), alanine (3%), ornithine (2%), and organic acids, mostly lactate (19%). The amide nitrogen of glutamine was recovered mostly as ammonia and the amino nitrogen of both amino acids was predominantly alanine. A nearly identical distribution of products was seen in previously published experiments in which rat intestine took up L-[U-^{14}C]-glutamine from arterial blood. The results are therefore consistent with a single metabolic pool within mucosal cells for blood-derived and lumen-derived glutamine. When 6 mM glutamine was continuously perfused through the lumen, jejunal segments metabolized arterial and luminal glutamine at approximately equal rates [130-190 nmol min^{-1} (g of tissue)$^{-1}$]. The total combined rate was 1.7 times the rate of utilization of arterial glutamine alone in jejunal segments not absorbing glutamine. These results provide the first quantitative data on comparative metabolism by the intestine of substrates from the lumen and from blood. Rat intestine apparently metabolizes nearly all absorbed dietary glutamate and most glutamine in addition to circulating glutamine derived from other tissues.

3226 THE INFLUENCE OF INFUSIONS OF METHIONINE AND METHIONINE + GLUCOSE ON THE MORPHOLOGY AND FUNCTION OF SELF-EMPTYING JEJUNAL BLIND LOOPS IN THE RAT.

(Ger.) Menge, H.; Muller, K.; Lorenz-Meyer, H.; Riecken, E. O. (Medizinische Universitatsklinik, D-3550 Marburg a.d. Lahn, West Germany). *Virchows Arch. (Zellpathol.)* 18(2):135-143; 1975.

A study of the nutritive effect of an amino acid solution or a mixture of amino acid and sugar on the intestinal mucosa was investigated. Self-emptying blind loops of rat jejunum were perfused 3 times daily for 24 or 31 days with a Ringer solution or saline containing methionine and glucose or methionine alone. This was accomplished through a tube conveyed s.c. to the back of the neck. Methionine infusion induced a significant rise in the villus height of the mucosa of the blind loops; this was accompanied by an increased *in vivo* glucose absorption. In mucosal homogenates, there was a tendency toward an increase in dipeptidase activity but not in disaccharidase level. Infusion of a mixture of glucose and methionine led to lengthened crypts, as well as to larger villi. Glucose transport was again increased, and there was a small rise in both dipeptidase and disaccharidase activities.

3227 STUDIES ON THE BRUSH BORDER MEMBRANE OF MOUSE DUODENUM. II. MEMBRANE PROTEIN METABOLISM.

(Eng.) Billington, T.; Nayudu, P. R. V. (Dept. Zoology, Monash Univ., Clayton 3168, Victoria, Australia). *J. Membr. Biol.* 27(1/2):83-100; 1976.

The duodenal microvillus membrane protein metabolism of Swiss mice was measured using radioactive labeling techniques. Labeled amino acids [tritiated L-leucine (50 mCi/mM), ^{14}C-L-leucine (100-250 mCi/mM), ^{14}C-L-tyrosine, ^{14}C-DL-phenylalanine, and ^{14}C-L-valine (each 10 mCi/mM)] were introduced into the lumen of ligatured duodena. Following exposure to label, brush border membranes were isolated and analyzed. Experiments measuring the specific activity of protein labeled with a single amino acid revealed that total membrane protein appeared to turn over in about 14 hr. Protein in the mucosal homogenate had a turnover rate of about 8 hr. Turnover rates of individual proteins were measured with single and dual isotope experiments. Membrane protein was solubilized with sodium dodecyl sulphate (SDS) buffer. Single isotope experiments showed that all polypeptides separated on SDS-gels were maximally labeled at 6 hr after injection. Bands did not incorporate label linearly. Rates of loss (degradation) of label from membrane proteins in the 17 bands appeared to be related to the estimated molecular size of the proteins. Rates were highest for larger polypeptides. A double isotope technique, in which proteins were allowed to incorporate the same amino acid in two isotopic forms, delivered with a set time interval, revealed that the ratios of the second label to the first in the SDS-separated polypeptides were highest for larger proteins and lowest for smaller polypeptides. A mixture of labeled amino acids (excluding leucine) was used to show that differences in leucine contents of diferent proteins was not an explanation for the ariation in level of leucine radioactivity in ifferent bands. For specific activity measurements hroughout, protein in gels was quantitated with eference to the uptake of Coomassie stain. The use f this stain was validated by the finding that, t low protein concentration, the amount of stain aken up was proportional to the amount of bovine erum albumin or membrane protein loaded.

228 CALCIUM-BINDING ACTIVITY OF RAT INTESTINAL MUCOSA AFTER MASSIVE SMALL BOWEL RESEC-TION. (Eng.) Urban, E.; Jordan, J. W.; Pena, M.; erguson, K. A. (Univ. Texas Health Science Center, 703 Floyd Curl Drive, San Antonio, TX 78284). *Di-estion* 13(3):153-161; 1975.

he level of mucosal calcium binding activity in 50-m segments of duodenum, midgut, and ileum was investigated in male Sprague-Dawley rats 6-7 weeks after extensive proximal or distal small bowel resection or sham-operation. Initial and final body weights of sham operated and proximally and distally resected groups of animals did not differ significantly from the initial and final weights of a normal group ($p>0.05$). Sham-operation did not alter the calcium binding activity of midgut located on either side of the line of intestinal transection ($p<0.8$). Calcium binding activity increased significantly in duodenum ($p<0.001$) and midgut ($p<0.05$), but it did not change in ileum ($p<0.2$) in the animals receiving proximal resection. Binding activity remained greatest in the duodenum and decreased caudally in both the sham operated and normal groups of animals. In contrast to proximal resection, binding activity decreased significantly in duodenum (75%) in distally resected rats, but midgut and ileal binding activities were unchanged from sham operated animals. The results indicate that mucosal calcium binding activity also undergoes changes after massive intestinal resection and that the binding activity in the remaining gut varies with proximal or distal small bowel resection.

3229 PRIMATE PANETH CELL DEGENERATION FOLLOWING METHYLMERCURY HYDROXIDE INGESTION. (Eng.) Mottet, N. K.; Body, R. L. (Univ. Washington, Sch. Medicine, Seattle, WA 98195). *Am. J. Pathol.* 84(1): 93-110; 1976.

The ultrastructural effects of methylmercury on the intestinal epithelium were studied in 14 adolescent male *Macaca mulatta* monkeys weighing 3-5 kg. Two controls received daily an applesauce vehicle without methylmercury. Nine chronic low-dose animals received methylmercury at a dose of 0.2-1.0 mg/day for 80-491 days. Three acute high-dose animals received 2.0 mg methylmercury for 17-18 days, when they became terminally ill. Light and electron microscopic observations were made on postmortem samples of duodenum and ileum following perfusion and immersion fixation in a glutaraldehyde-paraformaldehyde fixative. Numerous uniquely structured inclusions were prominent in the Paneth cells of the chronic low-dose animals, and some necrotic Paneth cells were seen, especially in the animals receiving the higher doses and in those receiving methylmercury for a long time. Acute high-dose treatment produced some inclusions in the Paneth cells, which were similar to those of the chronic low-dose group, but degenerative and necrotic cells were observed more frequently. These alterations were not seen in other intestinal epithelial cells. It is concluded that Paneth cells are selectively altered and that Paneth cells may eliminate metals from the body.

3230 THE EFFECT OF HIGH TEMPERATURE ON THE ENZYMATIC ACTIVITY OF THE SMALL INTESTINE OF THYROIDECTOMIZED RATS. (Rus.) Rakhimov, K.; Korotina, N. A. (Dept. Physiology, Uzbek SSR Acad. Sciences, Tashkent, USSR). *Biull. Eksp. Biol. Med.* 80(9):31-33; 1975.

3231 FAT METABOLISM OF THE SMALL INTESTINE AND ITS RELATION TO THE LIPID AND LIPOPROTEIN METABOLISM OF THE ORGANISM. (Ger.) Gangl, A. (Ordinariat fur Gastroenterologie, Universitat Wien, Carnisongasse 13, A-1090 Vienna, Austria). *Acta Med. Austriacc (Suppl.)* 2(3):1-49; 1975.

See also, 3067, 3083, 3135, 3175.

GENERAL

3232 STUDY OF INDIRECT METHODS FOR MEASURING HEPATIC BLOOD FLOW IN THE ISOLATED PERFUSED DOG LIVER. (Eng.) Groszmann, R. J.; Dubin, M.; Royer, M. (Veterans Admin. Hosp., West Spring St., West Haven, CT 06516). *Digestion* 13(4):220-231; 1975.

The reliability of the constant infusion clearance and extraction technique (CIT) and the single injection clearance method (SIT) for measuring hepatic perfusate flow at different levels of liver function was assessed. In 36 isolated perfused dog livers, hepatic perfusate flow (HPF) was monitored by a direct method (DM), and the HPF was simultaneously measured with an indirect method (IM) utilizing BSP as indicator (20 SIT and 16 CIT). In 16 experiments, absolute 750 mM ethanol and 600 μM sodium taurocholate were separately utilized to impair BSP metabolism. By comparison with DM, in the experiments with an extraction ratio (ER) of BSP lower than 10%, the error of the IM was 154.57 ± 46.55 ml/min for the CIT and 107.25 ± 34.20 ml/min for the SIT. This error was significantly greater than in the experiments with an ER greater than 10% (CIT 15.70 ± 3.88 ml/min, SIT 8.20 ± 1.38, $p<0.01$). In the studies with ER less than 10%, no difference was found in the error detected with the SIT (107 ± 34.20 ml/min) and CIT (154.37 ± 46.55 ml/min) measurements; in the experiments with an ER greater than 10%, the error with the CIT (15.70 ± 3.88 ml/min) was greater than the one attained with the SIT (8.20 ± 1.38 ml/min, $p<0.10>0.05$). It is concluded that both methods are reliable techniques for measuring HPF in livers with normal or near normal clearance capacity, but even in these ideal experimental conditions, the values for HPF are inaccurate when the liver clearance function is moderate or severely impaired.

3233 ISOLATION, COMPOSITION AND REACTIVITY OF THE NEUTRAL GLYCOPROTEINS FROM HUMAN MECONIUMS WITH SPECIFICITIES OF THE ABO AND LEWIS SYSTEM.

(Eng.) Cote, R. H.; Valet, J. P. (Universite Laval, Dept. Biochimie, Quebec, Quebec, G1K 7P4, Canada). *Biochem. J.* 153(1):63-73; 1976.

The chemical and immunological properties of blood group specific A$_1$, B, AB, H and Le^a neutral glycoproteins were studied. They were isolated from suitable pools of human normal meconiums by a preliminary fractionation with a cationic detergent at pH 5 and 9 (borate), followed by ion exchange and gel chromatography. Out of more than 500 meconiums tested, 19% were inactive to the ABH system. The ABH materials had sedimentation coefficients of 10S-11S, while the Le^a preparation, not strictly homogeneous, showed a coefficient of 7S. The glycoproteins all possessed a common peptide core, but they differed from one another with respect to their fructose, galactose, and hexosamine content. There were stable ratios of N-acetylglucosamine/galactose (4:3) in the B, H and Le^a materials and of N-acetylglucosamine/galactose (24:39) in the A, H, and Le^a materials, from which the numbers of A and B determinants were estimated. In the ABH substances, the ratio of glucosamine to the sum of threonine and serine was stable. Presumably because of genetic factors, the amount of fucose varied among the different glycoproteins, but it was always definitively lower than that in the average cyst substances. Various serological tests and precipitin methods were used to measure the potency, purity, and integrity of the preparations, including comparisons between A$_1$ and A$_2$ substances from this source. The Le^b activity did not appear to be as high as it is in glycoproteins from adults; this may have been a possible interpretation due to the immature Lewis system as observed on erythrocytes and it may explain their very strong inhibiting power to iso-agglutinins. It is concluded that the family of neutral glycoproteins isolated from human meconiums clearly differs in some aspects from the corresponding ones in cyst fluids. It is suggested that this is due to the source itself, and to the evolution of the integrated Lewis system.

3234 RABBIT GUT-ASSOCIATED LYMPHOID TISSUE: MAJOR PATHWAY FOR THORACIC DUCT LYMPHOCYTE CIRCULATION.

(Eng.) Perey, D. Y. E.; Milne, R. W. (McMaster Univ. Medical Center, Hamilton, Ontario, Canada). *Lab. Invest.* 33(6):678-686; 1975.

Cytokinetic studies were conducted in rabbits to characterize the distribution of both uridine- and thymidine-labeled thoracic duct lymphocytes (TDL) in various lymphoid tissues. Rabbits received i.v. injections of 8-11 x 10^8 autologous or allogeneic TDL 95% of which had incorporated ^{3}H-uridine during a 1-hr *in vitro* incubation. Autoradiographs of tissues collected 24 hr after injection of TDL failed to demonstrate any trapping of label in liver or *in vivo* reutilization of ^{3}H-uridine. No differences in the distribution of labeled cells were noted between recipients of autologous and allogeneic TDL. The paracortical areas of lymph nodes and periarterial areas of splenic follicles contained many heavily labeled cells; these areas therefore appear to correspond to thymus-dependent areas, as in other rodents. The tonsils contained densely packed sheets of labeled cells. In the tonsillar, but not in other germinal centers, evenly distributed, lightly labeled cells were seen. Small clusters of heavily labeled cells were seen in the bronchus-associated lymphoid tissue. In the gut-associated lymphoid tissue (GALT) such as the appendix, sacculus rotundus, and Peyer's patches, densely packed and heavily labeled cells were seen in the interfollicular areas; fewer heavily labeled cells were scattered throughout the dome and corona of GALT. In the dome and corona, however, there were many lightly labeled cells. The germinal centers of GALT were lacking totally in uridine-labeled cells. Some 20% of TDL collected 24 hr after injection of uridine-labeled TDL were labeled, thereby reflecting considerable recirculation of TDL. Thymidine-labeled immunoblasts (24-48 x 10^6), obtained from the TDL incubated with ^{3}H-thymidine *in vitro*, and injected into autologous or allogeneic recipients, which were killed 24 hr later, revealed heavily labeled cells in the intestinal lamina propria, the dome, corona, and interfollicular areas of GALT, as well as throughout the spleen, lymph nodes, and tonsils. There was a two to threefold higher concentration of labeled cells in the appendiceal and mesenteric lymph nodes than in respective popliteal nodes. It is concluded that rabbit GALT contains a substantial number of cells belonging to the pool of recirculating lymphocytes and that B and T cells in the thoracic duct may have different rates of uridine incorporation, as has been shown in other rodents.

3235 ENTERIC MIGRATION OF RADIOLABELED LYMPHOCYTES.

(Eng.) Solomon, G. E.; Taub, R. N. (Mt. Sinai Sch. Medicine, New York, NY 10029). *Cell. Immunol.* 23(1):108-116; 1976.

The migratory patterns of circulating radio-isotopically labeled lymphocytes were studied in mice by means of serial transfer into syngeneic recipients. Mice were injected with lymphocytes labeled with 5-iodo-2-deoxyuridine-^{125}I (IUDR) or sodium chromate-^{51}Cr. These lymphocytes were obtained from various lymph nodes, thymus, spleen, and

Peyer's patches. The radioactivities present in various enteric and non-enteric tissues of recipient mice were measured for up to 24 hr. The patterns of distribution of the two labels were very different. The labels were equally distributed amongst the non-enteric tissues; however, IUDR showed a marked accumulation in gut tissues. Only 1% of the total recovered ^{51}Cr was present in the gut after 2 hr; however, the amount of IUDR in gut increased from 2 to 24 hr, with approximately 41% of the label present in the gut at the end of the experiment. It is concluded that lymphocytes from all origins display this preference and that there is no species difference in migration patterns of the labels. It is suggested that the IUDR specific lymphocytes are a lymphocyte subpopulation, and that immature thymocytes possess migrational specificity and may leave the adult thymus and colonize gastrointestinal tissue.

3236 DEGRADATION OF BLOOD GROUP ANTIGENS IN HUMAN COLON ECOSYSTEMS. I. IN VITRO PRODUCTION OF ABH BLOOD GROUP-DEGRADING ENZYMES BY ENTERIC BACTERIA. (Eng.) Hoskins, L. C.; Boulding, E. T. (Veterans Admin. Hosp., Cleveland, OH 44106). *J. Clin. Invest.* 57(1):63-73; 1976.

The production of blood group degrading (BGD) enzymes in fecal cultures was investigated to determine whether the cultures are a source for enzyme purification and how blood group antigen degrading enzymes are adapted in individual human colon ecosystems. BGD enzymes were present in fecal cultures from 27 healthy subjects, including ABH nonsecretors. Heat sensitive obligate anaerobes were their major source. From 39 to 85% of the total enzyme activity produced by growing cultures was extracellular. Commercial hog gastric mucin (2 mg/ml) and salivary glycoproteins, including Le^a saliva which lacks A B, and H antigens, enhanced production of A-, B-, and H-degrading activity in anaerobic fecal cultures, irrespective of the glycoprotein's blood group specificity. The host's ABO blood type and secretor status affected the specificity of BGD enzymes produced by fecal bacteria *in vitro*. Fecal inocula from B secretors incubated with hog gastric mucin (A and H specificity), or with Le^a saliva, produced a 2- to 20-fold greater levels of B-degrading than A- or H-degrading activity and inocula from A secretors, in similar media, produced greater levels of A-degrading than B- or H-degrading activity. BGD enzymes produced in fecal cultures were glycosidases and not proteases. The B-degrading enzyme cleaves the B antigenic determinant α-D-galactose from the oligosaccharide side chains of mucin glycoproteins with B specificity. It is concluded that anaerobic fecal cultures containing blood group substances are a feasible source for purifying blood group antigen degrading enzymes.

3237 INDUCTION OF UNDIFFERENTIATED ADENOCARCINOMA IN THE STOMACH OF RATS BY N-METHYL-N'-NITRO-N-NITROSOGUANIDINE WITH VARIOUS KINDS OF SURFACTANT. (Eng.) Takahasi, M; Fukushima, S.; Hananouchi, M. (Nagoya City Univ. Med. Sch., Kawasumi 1, Mizuho-cho, Mizuho-ku, Nagoya 467, Japan). *Gann* 17:255-267; 1975.

The carcinogenic effect of N-methyl-N'-nitro-N-nitrosoguanidine (MNNG) combined with four kinds of surfactant--polyoxyethylene sorbitan monostearate, polyoxyethylene nonylphenyl ether, and two types of alkylbenzenesulfonate--was investigated in male Wistar rats. The rats were divided into four groups and were administered either 100 mg/l MNNG containing 0.4% Tween 60 (group I), 100 mg/l MNNG containing 0.2% Nonipol (group II), 100 mg/l MNNG containing 0.1% hard type alkylbenzenesulfonate (group III), or 100 mg/l MNNG containing 0.1% soft type alkylbenzenesulfonate (group IV). Upon termination of the experiment, all rats that died or were killed were autopsied. The findings showed that the incidence of adenocarcinomas in the glandular stomach was 40-80% in all groups. The tumors formed polypoid nodules or ulcerative umbilicated nodules with elevated borders. Some infiltrated widely into the stomach wall and invaded the serosa. Undifferentiated adenocarcinomas were observed in 4 of 10 adenocarcinomas in group I, in 3 of 12 in group II, in 2 of 9 in group III, and in 2 of 4 in group IV. In contrast to the well differentiated tumors, the undifferentiated types were characterized by loss of glandular arrangement. The anaplastic tumor cells showed polymorphism, increased basophilia of the cytoplasm, and hyperchromatism of the nucleus. Electron microscopic examination revealed two types of signet ring cells: one type was closely packed with mucin, pushing the nucleus to one side and resembling a signet ring; the other type had a small cystic luminal structure in the cytoplasm, its wall lined with microvilli projecting into the lumen. It is concluded that the four groups exhibited prominent carcinogenesis as compared with the control group, and that undifferentiated adenocarcinoma of the experimental cancer resembles that of human gastric cancer.

3238 DUODENOGASTRIC REFLUX OF LYSOLECITHIN IN THE PATHOGENESIS OF EXPERIMENTAL PORCINE STRESS ULCERATION. (Eng.) Kivilaakso, E.; Ehnholm, C.; Kalima, T. V.; Lempinen, M. (Second Dept. Surgery, Univ. Helsinki, Haartmaninkatu 4, 00290 Helsinki 29, Finland). *Surgery* 79(1):65-69; 1976.

The role of duodenogastric reflux of lysolecithin in the pathogenesis of gastric stress ulcerations was investigated with a swine shock-ulcer model in 27 piglets weighing 8-12 kg. In an intact animal, the average concentration of intragastric lysolecithin before shock was 138 μg/ml. At the end of the shock period, the average concentration of lysolecithin was 540 μg/ml, and the overall amount in the gastric juice was 14.3 mg. Following hemorrhagic shock (3 hr duration; mean arterial pressure, 40 mm Hg), all six control animals with normal gastroduodenal continuity developed gastric ulcerations. Interruption of duodenogastric reflux by duodenal exclusion and gastrojejunostomy completely abolished the development of these ulcerations in six test animals. When the interrupted duodenogastric reflux was replaced artificially by intragastric instillation of lysolecithin (500 μg/ml, 25 ml), all six animals developed lesions. Intragastric lysolecithin without shock had no effect. The results support the concept that regurgitation of duodenal juice into the stomach is an essential factor in the pathogenesis of gastric stress ulceration and suggests that lysolecithin is one of the active components in duodenal juice.

3239 MICROVASCULAR CONTROL IN INTESTINAL MUCOSA OF NORMAL AND HEMORRHAGED RATS. (Eng.)

Bohlen, H. G.; Hutchins, P. M.; Rapela, C. E.; Green, H. D. (Wake Forest Univ., Bowman Gray Sch. Medicine, Winston-Salem, NC 27101). *Am. J. Physiol.* 229(5):1159-1164; 1975.

The mucosal microcirculation in innervated and denervated small intestine was investigated in anesthetized male Wistar rats. Denervation did not cause significant ($p>0.05$) diameter changes in the precapillary vasculature; however, venules did constrict significantly ($p<0.05$). Denervating a short loop of small intestine did not change the overall systemic cardiovascular response of the animals during and following hemorrhage. The control diameters of the innervated and denervated arterioles were not significantly different ($p>0.05$). The denervated vessels dilated significantly ($p<0.05$) and the innervated vessels constricted significantly ($p<0.05$) during the hemorrhage period. The innervated precapillary sphincters constricted significantly ($p<0.05$) and the denervated vessels dilated significantly ($p<0.05$) during the hemorrhage period. The innervated venules, which did not respond during the carotid occlusion, constricted significantly ($p<0.05$) during the hemorrhage period. In contrast, the denervated second order venules dilated significantly ($p<0.05$) during the hemorrhage period. The denervated collecting venules dilated significantly ($p<0.05$) during the first half of the hemorrhage period and constricted to their control diameter during the latter half of the hemorrhage period. The vasoconstriction of the innervated vasculature during hemorrhage contributed to a stoppage of blood and epithelial detachment; these responses did not occur in the dilated, denervated vasculature. It is concluded that neutral vasoconstriction, qualitatively similar to that in normal animals during the baroreceptor reflex, contributes to the vascular and tissue impairment in the intestinal mucosa during hemorrhage.

3240 THE EFFECTS OF CALCIUM AND MAGNESIUM ON INHIBITORY JUNCTIONAL TRANSMISSION IN SMOOTH MUSCLE OF GUINEA PIG SMALL INTESTINE. (Eng.)

Holman, M. E.; Weinrich, J. P. (Dept. Physiology, Monash Univ., Clayton, Victoria 3168, Australia). *Pfluegers Arch.* 360(2):109-119; 1975.

The effects of calcium and magnesium on inhibitory junctional transmission in smooth muscle of guinea pig small intestine was investigated using intracellular electrodes. Transmural stimulation in the presence of atropine (3×10^{-7} g/ml) caused a transient hyperpolarization and inhibitory junction potential (IJP). Both divalent cation concentrations affected the amplitudes of IJP's. When either the Mg concentration was increased (1-20 mM) or the Ca concentration was decreased (2.5-0.25 mM), there was a marked decrease in the amplitude of the IJP. At 0.25 mM Ca^{2+}, the IJP amplitude was reduced to about 20% of its normal value. Increased Mg^{2+} depressed the amplitude of the IJP's, so that a much larger Ca^{2+} concentration was required to produce IJP's with amplitudes comparable to those obtained with 1 mM Mg^{2+}. With 10 mM Mg^{2+} and 0.25 mM Ca^{2+}, the IJP was abolished. The IJP amplitude decreased to about 30% of its original value, with a 20-fold increase in Mg^{2+}. However, while reducing Ca^{2+} by one half reduced the IJP amplitude, increasing Mg^{2+} had no effect until 10 times the normal concentration was reached. Indirect evidence is presented suggesting that the decrease in amplitude of the IJP is due to a decrease in the amount of transmitter released. The results indicate that the size of the IJP is a function of the concentration of the Ca and Mg ions. It appears that the release of transmitter from these nerves utilizes the same mechanism as other nerve endings.

3241 THE ENTEROGLUCAGON RESPONSE TO INTRAJEJUNAL INFUSION OF GLUCOSE, TRIGLYCERIDES, AND SODIUM CHLORIDE, AND ITS RELATION TO JEJUNAL INHIBITION OF GASTRIC ACID SECRETION IN MAN. (Eng.)

Holst, J. J.; Christiansen, J.; Kuhl, C. (Bispebjerg Hosp., DK-2400, Copenhagen NV, Denmark). *Scand. J. Gastroenterol.* 11(3):297-304; 1976.

The enteroglucagon response to intrajejunal infusion of glucose, triglycerides, and sodium chloride, and its relation to jejunal inhibition of gastric acid secretion was investigated in four volunteers. Venous blood samples were obtained before and 15 min after a continuous infusion of 0.5 µg/kg/hr pentagastrin over 3 hr. After 90 min of infusion, 100 ml of 50% glucose, 100 ml 9.3% NaCl, or 100 ml 20% triglyceride emulsion was infused over 5 min into the jejunum. A plateau of gastric acid secretion was reached after 45 min of infusion. Total glucagon was significantly depressed during hyperglycemia and reached significance at 3 hr ($p<0.05$). The glucose infusion led to a more than fivefold increase in total glucagon concentration in each subject ($p<0.025$). Concentration of pancreatic glucagon was not significantly changed, but the insulin increase was significant at 120, 135, and 150 min ($p<0.01$, $p<0.025$ and $p<0.05$, resp.). The infusion of triglyceride emulsion elicited a marked total glucagon response ($p<0.05$ at 120-150 min, $p<0.025$ at 165 and 180 min). There was an increase in the concentration of pancreatic glucagon ($p<0.05$) at 135 and 150 min, while the insulin and glucose values were unchanged. The infusion of NaCl led to a late and modest rise in total glucagon concentration ($p<0.05$ at 165 min), while insulin pancreatic glucagon, and glucose were unchanged. In almost all cases, the pentagastrin infusion led to a small increase in insulin concentrations after 15 min of infusion ($p<0.01$). It is concluded that enteroglucagon is not responsible for the jejunal inhibition of gastric acid secretion by jejunal administration of hyperosmolol NaCl solution, but it may participate in the inhibition evoked by jejunal administration of glucose or triglycerides.

3242 PROTECTION OF THE INTESTINAL MUCOSA DURING ISCHAEMIA BY INTRALUMINAL PERFUSION. (Eng.)

Mirkovitch, V.; Menge, H.; Robinson, J. W.

L. (Departement de Chirurgie Experimentale, Hopital Cantonal Universitaire, Lausanne, Switzerland). *Res. Exp. Med. (Berl.)* 166(2):183-191; 1975.

The function of the intestinal mucosa following 1 hr of ischemia was examined in mongrel dogs *in vivo* and *in vitro*. During ischemia, the intestinal loop was perfused with media of different composition to determine which provided the best protection for the epithelium. The absorption of water, ions, and glucose was then monitored *in vivo*, and the uptake of 1 mM phenylalanine and 1 mM β-methyl-D-glucoside by slices of mucosa was determined *in vitro*. The unprotected mucosa lost all active transport capacity *in vitro* following 1 hr of ischemia, and it was the site of a pronounced loss of water and ions into the lumen *in vivo*. *In vivo* glucose absorption was also abolished. If the loop was perfused with 0.2% glucose containing Krebs bicarbonate buffer, much of the *in vitro* transport capacity was retained. The loss of ions and water was prevented, and *in vivo* glucose absorption occurred. Perfusion with other media, such as isotonic mannitol (300 mOsm/l), Krebs bicarbonate buffer (285 mOsm/l), or Ringer-lactate solution (295 mOsm/l) resulted in a marked protection of the mucosa in comparison with the unperfused loop, but the effects were not as pronounced as those of the glucose containing buffer. It is concluded that the act of perfusing the intestine is the most important protective factor but that the presence of glucose in the perfusate does increase protection.

3243 INCREASED CYCLIC ADENOSINE 3',5'-MONOPHOSPHATE CONTENT IN GUINEA PIG ILEUM AFTER EXPOSURE TO Staphylococcus aureus DELTA-TOXIN.

(Eng.) O'Brien, A. D.; Kapral, F. A. (Dept. Medical Microbiology, Ohio State Univ., Columbus, OH 43210). *Infect. Immun.* 13(1):152-162; 1976.

The effect of delta-toxin on the cyclic AMP (cAMP) content of guinea pig ileum maintained *in vitro* was studied to compare *Staphylococcus aureus* delta-toxin with cholera toxin, which is known to increase cellular cAMP. Concentrations of delta-toxin as low as 0.40 μg/ml increased cAMP levels in guinea pig ileum after 2 hr of incubation at 37 C. Histological damage was seen in ileum exposed for 2 hr to 100 μg/ml of delta-toxin. As little as 3 μg of delta-toxin increased vascular permeability in guinea pig skin. Permeability changes became evident within 5 min and were maximal within 6 hr, whereas those produced by cholera toxin required 24 hr to become maximal. Benadryl (50 mg/kg, i.p.) did not interfere with the ability of these toxins to alter vascular permeability. Purified egg lecithin reduced the effectiveness of delta-toxin in the skin but it did not inhibit cholera toxin. Delta-toxin in concentrations as low as 0.1 μg/ml caused dislodgement of HeLa cells in tissue cultures. Therefore, delta-toxin appears unique in being the only bacterial toxin, currently known to alter water absorption in the ileum, that is capable of both increasing cAMP levels and being cytotoxic. These findings suggest a possible role for delta-toxin in the pathogenesis of staphylococcal enteritis.

3244 MULTIPLE FORMS OF HUMAN GLUTATHIONE S-TRANSFERASE AND THEIR AFFINITY FOR BILIRUBIN.

(Eng.) Kamisaka, K.; Habig, W. H.; Ketley, J. N.; Arias, I. M.; Jakoby, W. B. (National Insts. Health, Bethesda, MD 20014). *Eur. J. Biochem.* 60(1):153-161; 1975.

Several species of glutathione-S-transferase, designated as transferases alpha, beta, gamma, delta, and epsilon on the basis of increasing isoelectric points, were isolated from human liver. Molecular weight of the transferases was estimated by gel filtration on standardized columns of Sephadex G-100, yielding a value between 48,000 and 49,000.
Each transferase had a similar specific activity for a given electrophilic substrate; this was highlighted by the K_m values for 1-chloro-2,4-dinitrobenzene with transferases alpha, beta, gamma, delta, and epsilon (0.45, 0.40, 0.51, 0.63, and 0.43 mM, resp.) and the V values (940, 1300, 1205, 2910, and 2340 mol/min/mol/protein, resp.). These values are in marked contrast to rat glutathione transferases; the sepcific activity for a given substrate may differ by a factor of a thousand or more. Differences in dissociation constants, D_d, for bilirubin among the transferases varied by 10-fold although each enzyme species was able to bind bilirubin. The K_d for bilirubin was estimated as 65, 110, 34, 18, and 34 μM for transferases alpha, beta, gamma, delta, and epsilon, resp. Transferases alpha and delta bound indocyanine green with a K_d of about 20 μM for each enzyme and bound hematin with a K_d of 10 μM. The results indicate that there is a close resemblance among the human proteins; this is reflected in the reaction of each with a monospecific antibody, the identical spectrum of substrates, and the minor differences observed in kinetic constants.

3245 SUSCEPTIBILITY OF THE LIVER AND BILIARY TRACT TO ANAEROBIC INFECTION IN EXTRAHEPATIC BILIARY TRACT OBSTRUCTION: BACTERIOLOGICAL INVESTIGATIONS--AN EXPERIMENTAL STUDY IN RABBITS.

(Eng.) Nielsen, M. L.; Justesen, T. (31 Sofievej, DK-2900 Hellerup, Denmark). *Scand. J. Gastroenterol.* 10(7):769-775; 1975.

The influence of common duct occlusion on susceptibility to infection with anaerobic gram-negative rods was investigated in 18 New Zealand White rabbits in which ligation of the common duct was performed. Three *Bacillus fragilis* strains isolated from human infections and a stock culture of *Fusobacterium mortiferum* (1.9 x 10^9, 2.0 x 10^9, and 0.9 x 10^9 organisms for *B. fragilis* I, II, and III, resp.; 1.2 x 10^9 organisms for *F. mortiferum*) were injected i.v. Liver tissue, gallbladder, bile, and blood were investigated. Anaerobic culture procedures were based on the use of a "glove-box" with an oxygen-free atmosphere and prereduced, anaerobically sterilized media. Anaerobic transport was based on flushing of samples with oxygen-free carbon dioxide and transport-time of less than 30 min. Common duct occlusion significantly increased the number of infected animals inoculated with *F. mortiferum* and with the first two *B. fragilis* strains as compared to a control group of 18 inoculated animals without common duct occlusion. Spontaneous infection did not arise in a control group of animals with common duct ligation. It is concluded that in biliary tract occlusion, anaerobic bacteria are able to invade the biliary tract from the blood stream, and that biliary tract occlusion produces sufficient anaerobic conditions for obligate anaerobic bacteria to multiply in the bile.

3246 ACTION OF INTRAGASTRIC ETHANOL ON THE PANCREATIC SECRETION OF CONSCIOUS RATS. (Eng.) Cavarzan, A.; Teixeira, A. S.; Sarles, H.; Palasciano, G.; Tiscornia, O. (Inserm U 31, 46, Chemin de la Gaye, F-13009 Marseille, France). *Digestion* 13(3):145-152; 1975.

The pancreatic response to intragastric alcohol and intraduodenal hydrochloric acid was investigated in conscious male Wistar rats. Rats were given either 20% alcohol (A) or water (W) daily for 13 months. In A rats, the intragastric injection of 2 g/kg 20% ethanol significantly increased the pancreatic secretion of protein ($p<0.05$), and to a lesser extent, of water. In control rats, the response was biphasic. In the first 30 min, flow rate and protein output were significantly increased, while in the second hour, flow rate, protein, and bicarbonate outputs were significantly ($p<0.05$) lower than in the basal period. Intraduodenal injection of HCl increased the flow rate in both groups, but the protein output was only increased in the W group. Bicarbonate concentration and output were not significantly modified. Since the action of intraduodenal HCl in alcoholics and in controls is not different, it is probable that the release of secretin is not greatly modified in cases of chronic alcoholism.

3247 ACUTE HEMORRHAGIC PANCREATIC NECROSIS IN MICE: INFLUENCE OF THE AGE AND SEX OF THE ANIMALS AND OF DIETARY ETHIONINE, CHOLINE, METHIONINE, AND ADENINE SULFATE. (Eng.) Lombardi, B.; Rao, N. K. (Dept. Pathology, Univ. Pittsburgh, Pittsburgh, PA 15261). *Am. J. Pathol.* 81(1):87-100; 1975.

Factors influencing the development of acute hemorrhagic pancreatitis (pancreatic necrosis, AHPN), with fat necrosis were investigated in Swiss-Webster mice fed DL-ethionine with a choline-deficient diet. In mice fed a choline-deficient diet containing 0.5% ethionine, the incidence of AHPN with fat necrosis was 100% in young female mice (30 days old), 65% in adult females (70 days old), 70% in young males, and only 41% in adult males. All young female mice died within 5 days, while some of the adult mice and young males, which developed AHPN died on the sixth or seventh day of treatment. The incidence of hemorrhagic pancreas and fat necrosis increased with increasing amounts of ethionine in the diet. It was 10, 80, and 100% in young mice when the ethionine level was 0.10, 0.25, and 0.35%, resp. A majority of young mice fed 0.10% ethionine survived for at least 29 days. Of those fed 0.35% ethionine, all died within 4-10 days. The incidence was only 10-20% when 0.5% ethionine was fed with either a choline-supplemented diet or with laboratory chow. The development of pancreatic pathology was completely prevented by including in the diet 0.5% methionine, but not 0.5% adenine. The results indicate that ethionine administration can induce a variety of lesions in the pancreas of mice, depending upon the experimental conditions employed and the length of the treatment.

3248 EVALUATION OF [^{14}C]AMINOPYRINE CLEARANCE FOR DETERMINATION OF GASTRIC MUCOSAL BLOOD FLOW. (Eng.) Tague, L. L.; Jacobson, E. D. (Univ. Texas Medical Sch. Houston, Houston, TX 77025). *Proc. Soc. Exp. Biol. Med.* 151(4):707-710; 1976.

Studies to reduce the assay time and to evaluate the low concentrations of ^{14}C-labeled aminopyrine for determining gastric mucosal blood flow were performed in both anesthetized dogs and in conscious dogs with a gastric fistula and a Heidenhain pouch. A bolus of 3 μCi of ^{14}C-aminopyrine was injected intravenously in 168 ml saline. Then, a continuous infusion was started at a rate of 0.0125 μCi/min. Clearance was measured by both radiometric and spectrophotometric methods. There was a high correlation between the radiometric and spectrophotometric determinations; the radiometric method was easier, safer, and it allowed a larger number of samples to be determined. No significant differences were found between mucosal blood flows estimated simultaneously by ^{14}C-aminopyrine clearance and by unlabeled aminopyrine in anesthetized dogs during manipulation of the flows with 1.2 μg/kg/min histamine and 10 U/hr vasopressin, demonstrating that the labeled base may be used alone, without protection against metabolic degradation afforded by unlabeled aminopyrine. In the conscious dog with Heidenhain pouch, disappearance of residual ^{14}C label was complete within 36 hr. The clearance of small amounts of ^{14}C-aminopyrine was unaffected by injection of an unlabeled bolus containing 2,000 times more absolute aminopyrine than the total labeled dose, showing that mucosal extraction is not concentration-limited. It is suggested that small amounts of labeled aminopyrine may provide an excellent tool for examining the role of mucosal blood flow in the pathogenesis of gastric disease in man.

3249 PROLONGED INTESTINAL ASSISTANCE IN THE DOG. (Fre.) Joyeux, H.; Astruc, B.; Martin, P.; Yakoun, M.; Lafont, J.; Solassol, Cl. (Laboratoire de Biochimie des proteines, Faculte des Sciences, 34000 Montpellier, France). *Ann. Chir.* 28(9):795-802; 1974.

3250 CHANGES IN THE CONTENT OF ACETYLCHOLINE IN THE WALL OF THE STOMACH IN FORMATION OF "STRESS" AND "STEROID" ULCERS OF THE STOMACH IN THE ANIMALS WITH DISTURBED FUNCTION OF THE THYROID. (Rus.) Rosolovskii, A. P. (Ternopol Medical Inst., Ternopol, USSR). *Patol. Fiziol. Eksp. Ter.* (4):44-48; 1975.

3251 STUDY OF CERTAIN FACTORS IN THE COLONIZATION OF THE DIGESTIVE TUBE OF THE WHITE MOUSE BY Candida Albicans. (Fre.) Auger, P.; Joly, J. (Dept. Microbiology and Immunology, Univ. Montreal, Montreal, Quebec H3G 3J7, Canada). *Can. J. Microbiol.* 22(3):334-337; 1976.

3252 ARTERIAL ANATOMY OF THE COLON. (Fre.) Lamarque, J. L.; Bruel, J. M.; Senac, J. P.; Boulet, P.; Alonzo, R. (Cliniques Saint-Eloi, F 34059 Montpellier Cedex, France). *Ann. Radiol. (Paris)* 19(3):315-316; 1976.

3253 RADIOLOGICAL ANATOMY OF THE HEPATIC ARTERY. (Fre.) Lamarque, J. L.; Senac, J. P.; Bruel, J. M.; Gau, A.; Toulza, A. (Cliniques Saint-Eloi, F 34059 Montpellier Cedex, France). *Ann. Radiol. (Paris)* 19(3):316-318; 1976.

3254 THE DEVELOPMENT OF BACTERIAL FLORA IN THE GASTROINTESTINAL TRACT OF THE MONGOLIAN GERBIL. (Eng.) Majumdar, S. K.; Mosher, R. H. (Dept. Biology, Lafayette Coll., Easton, PA 18042). *Proc. Pa. Acad. Sci.* 48:139-141; 1974.

3255 INTERACTION OF ANTIBODIES WITH CHOLERA ENTEROTOXIN IN RAT SMALL INTESTINE: AN IN VTIRO STUDY [Abstract]. (Eng.) Wu, A.-L.; Walker, W. A. (Massachusetts General Hosp., Boston, MA). *J. Cell. Biol.* 67:465a; 1975.

3256 BLOOD COAGULATION STUDIES DURING ORTHOTOPIC LIVER TRANSPLANTATION IN PIGS. (Ger.) Muntean, W.; Rigler, B.; Stenzl, W.; Hermann, W.; Tentzeris, M. (Universitats-Kinderklinik Graz, Graz, Austria). *Acta Chir. Austriaca* 7(5):112-117; 1975.

3257 THE APPLICATION OF GUTHYMINE [GUANYLTHIOUREA] FOR TREATMENT OF INTESTINAL PARESIS IN PERITONITIS UNDER EXPERIMENTAL AND CLINICAL CONDITIONS. (Rus.) Timofeev, N. N.; Frolov, S. F.; Zhitniuk, R. I. (I. P. Pavlov First Leningrad Medical Inst., Leningrad, USSR). *Vestn. Khir.* 115(8):39-43; 1975.

3258 PURIFICATION OF LIPID EMULSIONS USED IN PARENTERAL FEEDING: LIVER PERFUSION STUDY IN ISOLATED RATS AND IN VIVO EXPERIMENT IN GUINEA PIGS. (Fre.) Dewailly, P.; Trupin, N.; Nouvelot, A.; Fruchart, J. C.; Jaillard, J.; Sezille, G. (Cite Hospitaliere, Institut Pasteur, 20, boulevard Louis XIV, 5012 Lille Cedex, France). *Lille Med.* 20(6): 578-583; 1975.

3259 EFFECT OF BETA-RECEPTOR BLOCKADE ON HEART RATE, HEPATIC BLOOD FLOW AND CIRCULATING NORADRENALINE DURING EXERCISE IN MAN [Abstract]. (Eng.) Christensen, N. J.; Trap-Jensen, J.; Clausen, J. P.; Noer, I.; Krosgsgaard, A. R.; Larsen, O. A. (Kommunehospitalet Arhus, DK-8000, Copenhagen, Denmark). *Acta Physiol. Scand.* 95(2):62A-63A; 1975.

See also, 3074, 3081, 3112, 3128, 3261, 3813.

3260 THE EVALUATION OF MALIGNANT GASTRIC NEOPLASMS BY ULTRASONIC B-SCANNING. (Eng.) Walls, W. J. (Univ. Kansas Medical Center, 39th St. and Rainbow Blvd., Kansas City, KS 66103). *Radiology* 118(1):159-163; 1976.

The diagnostic accuracy of ultrasonic B-scanning was evaluated in 11 patients with malignant gastric neoplasms, and its advantages and limitations were illustrated in three case reports. Surgery and histological findings demonstrated six true positive cases and two true negative cases, giving a diagnostic accuracy of 73%. Five true positive cases had gastric neoplasms that invaded the serosa via regional spread and presented as exogastric masses; they were detectable by ultrasound. There were three false negative studies. All patients in the true negative and false negative categories represented at least one of the three following situations: (a) the lesion infiltrated the mucosa and muscularis but did not thicken the gastric wall or extend far enough through the serosa to provide a detectable exogastric mass; (b) the lesion was located in the proximal fourth of the stomach, particularly the fundus and gastroesophageal junction; and (c) the patient had regional or distant metastases within the abdomen, but they were so small that areas of involvement were beyond the resolution of the ultrasonic equipment. It is concluded that diagnostic ultrasound is useful for evaluating patients with suspected malignant gastric neoplasm and it often complements the upper gastrointestinal series. In addition, demonstration of a mass by ultrasound is highly suggestive of exogastric extension, which is usually not demonstrable by other radiographic techniques or endoscopy.

3261 VASODILATORS IN THE CANINE MESENTERIC CIRCULATION: EVALUATION OF A POTENTIAL AID IN THE DIAGNOSIS OF GASTROINTESTINAL BLEEDING. (Eng.) Sovak, M.; Rosch, J.; Lakin, R. C. (Univ. California, San Diego, Sch. Medicine, La Jolla, CA 92093). *Invest. Radiol.* 10(6):595-607; 1975.

The radiodiagnostic potential of intra-arterially injected vasodilating agents was investigated in mongrel dogs. Their effect on total and segmental resistances (VR) of mesenteric vasculature, blood flow in the superior mesenteric artery and its bleeding branch, heart rate, and ventricular and systemic blood pressure was studied. Standard concentrations of test solutions were infused into perfusion tubing, either as a bolus or with a Harvard pump, to simulate the clinical situation. Dipyridamole, isoxsuprine, prochlorperazine, lidocaine, meglumine diatrizoate, and carbon dioxide were poor dilators. Phentolamine produced hypotension; glucagon and serpasil produced an extremely long dilation. A large and short vasodilation was produced with 1.5 mg/ml tolazoline and 0.03 mg/ml nylidrin, but both agents increased VR of the postcapillary segment and caused transient hypotension and arrhythmias; the side effects with nylidrin were smaller. Oxygen produced large and long vasodilation and minimal systemic effects. It is concluded that oxygen, or possibly nylidrin, are suitable agents when an intermittently bleeding mesenteric artery must be dilated for diagnostic purposes prior to angiography.

3262 ASSESSMENT OF ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY (ERCP) AND PURE PANCREATIC JUICE CYTOLOGY IN PATIENTS WITH PANCREATIC DISEASE. (Eng.) Hatfield, A. R. W.; Smithies, A.; Wilkins, R.; Levi, A. J. (London Hosp., Whitechapel, London, E1 1BB, England). *Gut* 17(1):14-21; 1976.

Pure pancreatic juice was collected from 61 patients with suspected pancreatic and biliary disease at the time of endoscopic retrograde cholangiopancreatography (ERCP) to evaluate this combined diagnostic approach for pancreatic disease. Final diagnoses in these cases included 26 with no detectable pancreatic disease, 9 with pancreatitis (5 relapsing and 4 chronic), and 26 with pancreatic carcinoma. A normal pancreatogram was obtained in 25 of the 26 normal subjects. A pancreatogram, obtained for eight of nine pancreatitis patients, showed changes compatible with pancreatitis in six. A pancreatogram was also obtained for 20 of the 26 pancreatic carcinoma patients. In 18 cases, radiological changes considered diagnostic of carcinoma were seen, and in 2 cases, changes suggestive of carcinoma were noted. Cytological studies on the group of 26 normal subjects revealed normal duct cells in all cases. Normal duct cells were also seen in all nine pancreatitis patients. However, in eight of these nine, numerous degenerate cells were noted. Malignant cells were seen in 14 of the 26 pancreatic carcinoma patients, and suspicious cytological findings were noted in an additional 3 patients. For the patients with pancreatic carcinoma, ERCP alone was diagnostic in 18 patients (65%); pure juice cytology alone was diagnostic in 14 patients (54%). When the results of ERCP and cytology were combined, a diagnostic conclusion was obtained in 24 of the 26 patients (92%). ERCP was of particular importance where proximal pancreatic tumors made cannulation impossible. In the six patients who had tumors obstructing the pancreatic duct rendering ERCP impossible, the addition of pure juice cytology converted a negative investigation into a diagnostic one. It is concluded that in pancreatic carcinoma, combined ERCP and pure juice cytology provide a rapid and safe pre-operative diagnosis, thus reducing the time of inpatient stay.

3263 SUCCESSFUL INTRAVENOUS CHOLECYSTOCHOLANGIOGRAPHY IN THE JAUNDICED PATIENT USING MEGLUMINE IODOXAMATE (CHOLOVUE). (Eng.) Robbins, A. H.; Earampamoorthy, S.; Koff, R. S.; Di Fazio, L. T.; Wickis, E. A.; Gertler, A. N. (Veterans Admin. Hosp., 150 South Huntington Ave., Boston, MA 02130). *Am. J. Roentgenol.* 126(1):70-76; 1976.

A clinical trial of meglumine iodoxamate (Cholovue) for i.v. cholangiocholecystography was performed in 18 patients with elevated levels of serum bilirubin. Ten to 30 cm^3 of a 40% aqueous solution of the agent were given i.v. over a 10-min period, and roentgenographic examinations were conducted to document the agent's effectiveness, to determine optimal dosage levels, and to assess its safety. The common bile duct was visualized in 12 of 18 cases, and the gallbladder was visualized in 14 cases. The agent was effective with bilirubin levels up to 6.5 mg percent. The optimal dose in patients with elevated bilirubin was in the range of 20 cm^3. No important adverse clinical nor laboratory reactions was observed. The new agent appears to offer a significant improvement over Cholografin, particularly for patients with elevated bilirubin levels.

3264 PROSPECTIVE, RANDOMIZED STUDY OF DIAGNOSIS AND OUTCOME IN ACUTE UPPER-GASTROINTESTINAL BLEEDING: ENDOSCOPY VERSUS CONVENTIONAL RADIOGRAPHY.

(Eng.) Morris, D. W.; Levine, G. M.; Soloway, R. D.; Miller, W. T.; Marin, G. A.; *et. al.* (Hosp. Univ. Pennsylvania, Philadelphia, PA). *Am. J. Dig. Dis.* 20(12):1103-1109; 1975.

The diagnostic accuracy of panendoscopy was compared prospectively with upper gastrointestinal (UGI) barium series by randomly assigning 60 patients with mild to moderate UGI hemorrhage to one of these diagnostic procedures. The clinical significance of using either as the initial procedure was also evaluated. Definitive localization of the source of bleeding was made initially in 69% of the endoscopy group and in 21% of the UGI group ($p<0.0005$). Of 54 patients who underwent both studies, endoscopy was definitive in 67% and UGI series was definitive in 22%. Thus, endoscopy also made more diagnoses when used as the second study ($p<.01$). The use of endoscopy as the initial procedure led to significantly more rapid diagnosis than with UGI series. However, there were no significant differences between the two groups in clinical outcome. Endoscopy is the initial diagnostic procedure of choice in patients with mild to moderate upper-gastrointestinal bleeding because it enables detection of superficial bleeding lesions and has significantly increased the speed of diagnosis.

3265 DIAGNOSIS OF CARCINOMA OF THE PAPILLA OF VATER BY DUODENOFIBERSCOPY: SIMULTANEOUS ATTEMPT ON ENDOSCOPIC OBSERVATION, ASPIRATION CYTOLOGY, RETROGRADE PANCREATOCHOLANGIOGRAPHY AND BIOPSY.

(Eng.) Harada, H.; Mandai, H.; Tsurumi, T.; Yamamoto, N.; Tomiyama, Y.; Hinofuji, T.; Mandai, M.; Kikuchi, T.; Taguchi, H.; Matsuo, K. (Okayama Univ. Medical Sch., 5-1, Shikada-machi, 2-chome, Okayama City, 700 Japan). *Gastroenterol. Jpn.* 10(1):6-19; 1975.

Carcinoma of the papilla of Vater was diagnosed by duodenofiberoscopy and an endoscopic pancreatocholangiography in 13 patients. Carcinomas were divided into three types. Type I contained lesions that were endoscopically observed as polypoid or papillary tumors of the major papilla, originating from the duodenal surface and sometimes accompanied by crater. Type II contained lesions that were endoscopically observed as marked swelling of the longitudinal fold with no pathological findings of the major papilla other than redness. This type originates from the ampulla or the intraduodenal bile or pancreatic duct. Type III contained lesions that were endoscopically observed as normal papilla of Vater or minimal swelling of the major papilla, originating from the ampulla. General fatigue was noted in 10 cases, jaundice in 5, intermittent jaundice in 6 others, and fever in 8. Laboratory tests showed serum bilirubin, 0.45-25.9 mg/dl; SGOT, 17-240 U; SGPT, 34-350 U; and serum alkaline phosphatase, 7.0-31.2 BLU. Hypotonic duodenography diagnosed type I lesions, showing polypoid or papillary tumor with uneven or granular surface of the major papilla. Type II lesions were shown as swelling of the papilla of Vater with smooth surface. Type III lesions were hardly diagnosed by this method at all. For type I lesions, endoscopic observation and biopsy were usually sufficient. Type II lesions were not confirmed by endoscopic observation alone, and biopsy was usually negative. Type III lesions required aspiration cytology and pancreatocholangiography. Carcinomas of the papilla of Vater with crater can be differentiated without difficulty from choledochoduodenal fistula. It is concluded that duodenofiberscopic examination is the most useful method for diagnosing carcinomas of the papilla of Vater, as it not only allows elucidation of the presence and malignant nature of the lesion, but it also allows localization of the lesion by simultaneously performing endoscopic observation, aspiration cytology, pancreatocholangiography, and biopsy.

3266 CHOLEGRAPHY-INDUCED ACUTE RENAL FAILURE: ITS RELATION TO SUBSEQUENT SURGICAL THERAPY.

(Eng.) Gleysteen, J. J.; Aldrete, J. S.; Rutsky, E. A. (Univ. Station, Dept. Surgery, Birmingham, AL 35294). *South. Med. J.* 69(2):173-176; 1976.

The case reports of three patients who developed acute renal failure shortly after receiving p.o. or i.v. cholegraphic agents are presented, and the pertinent literature is reviewed. Two patients required subsequent surgical intervention; one had cholecystectomy and common bile duct exploration, and the other had right hemicolectomy and cholecystectomy for coexistent gangrenous cholecystitis and appendicitis. The third patient had chronic active liver disease. In all three, the cholegraphic agents were given while the patients were dehydrated. Two patients required hemodialysis. In all three, renal function returned to normal and was not altered by the subsequent surgical intervention. The cause of this complication remains uncertain, but hepatic dysfunction and the combination of uricosuria and dehydration are possible factors. It is concluded that patients should be properly hydrated prior to the administration of cholegraphic agents. Surgical intervention, if necessary, can be performed safely after renal function has returned to normal.

3267 ANGIOGRAPHIC PATTERNS IN EXPERIMENTAL OBSTRUCTION OF THE SMALL BOWEL.

(Eng.) Wojtowicz, J.; Wirga, Z.; Wirga, E. (Poznon Medical Sch., Poznan 61-833, Szkolna 8/12, Poland). *Invest. Radiol.* 10(6):583-594; 1975.

Angiographic studies were conducted in four main types of low small bowel obstruction, which were experimentally induced in the rabbit, to assess the dynamics of arterial changes in the intestinal wall. The angiographic patterns during the first 48 hr after obstruction were analyzed. Twenty-three rabbits had simple obstruction, 16 had strangulation, 17 had intussusception, and 13 had created volvulus. The type and rate of progression of peripheral arterial changes depended upon the mechanics of intestinal obstruction. Patency, caliber, and course of the ileal branches of the superior mesenteric artery were disturbed at different stages of strangulation, volvulus, and intussusception, but remained unchanged in simple obstruction. Stretching and displacement of the arteriae rectae and connecting branches occurred corresponding to the degree of distension of the obstructed bowel. In the strangulated or twisted loop, these arteries were subject to rapid thrombotic changes beginning at the antimesenteric border. The villus arterial network and arterial plexus of the mucosal and submucosal layer underwent massive thrombosis and destruction a few hours after strangulation and during later stages of volvulus. Destruction of the mucosal vessels, caused by progressive necrosis of the mucosa, appeared in simple obstruction and intussusception after 48 hr. The site of the obstruction corresponded to the clear-cut border between various arterial patterns of the distended and collapsed segment. Although each type of obstruction showed some specific findings, the most characteristic and individualistic pattern consisted of a parallel arrangement of arcuate arteries at the mesenteric border in intussusception.

3268 ANGIOGRAPHY IN CROHN'S DISEASE REVISITED.

(Eng.) Brahme, F.; Hildell, J. (Veterans Admin. Hosp., San Diego, CA 92161). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 126(5):941-951; 1976.

A total of 123 angiograms were performed in 116 patients with Crohn's disease to evaluate angiography as a diagnostic tool. Angiography provided information on the presence and location of the lesions in Crohn's disease in more than 90% of the cases. Diagnostic failures were mainly due to paucity of changes in lesions of mild inflammatory activity. Many angiographic features are nonspecific; only the zoning sign and the presence of para-intestinal mesenteric neovasculature were considered diagnostic. These signs were present in 30% of the cases. Right angle branching was frequently difficult to evaluate, and thickening of the gut was observed in ulcerative colitis. The presence of ileal abnormalities was diagnostically helpful in ileocolic Crohn's disease, but other signs must be used in patients with colonic involvement exclusively. Among eight patients with Crohn's disease confined to the colon, a clearly recognizable zoning sign was present in five (15%), but distinguishing features were absent in three. Colitis, caused by Crohn's disease, was distinguished from ulcerative colitis by angiography in only 30% of the cases. However, angiography along with barium studies will reveal the presence of lesions. It is concluded that angiography is a potential differential diagnostic aid in doubtful cases of inflammatory and malignant bowel disease.

3269 LONGITUDINAL SINUS TRACTS IN GRANULOMATOUS COLITIS AND DIVERTICULITIS.

(Eng.) Marshak, R. H.; Lindner, A. E.; Pochaczevsky, R.; Maklansky, D. (1075 Park Ave., New York, NY 10028). *Semin. Roentgenol.* 11(2):101-110; 1976.

The x-ray features that usually distinguish granulomatous colitis from diverticulitis are described. The linear extent of the longitudinal sinus tract in diverticulitis is usually short (3-6 cm) and is located in the sigmoid section, while the tracts in granulomatous colitis tend to exceed 10 cm and can be located anywhere in the colon. In diverticulitis, the diverticula are sharply defined and often contain a fecalith, while in granulomatous colitis, the diverticula appears as a triangular abscess with cap-like configuration. The diverticular abscess of diverticulitis has an intramural defect or an arcurate configuration of stretched fold. In granulomatous colitis, the folds are thickened and edematous with increased secretions. There are no transverse fissures in diverticulitis, and the folds usually have arcurate configuration. Transverse fissures are present in granulomatous colitis and mucosal edema produces a stepladder configuration. The mucosa is normal in diverticulitis, while in granulomatous colitis there are mucosal ulcerations or cobblestoning. It is suggested that in approximately 20% of patients who have diverticulitis alone, granulomatous colitis is simulated by a long segment of disease, marked spasm and irritability, multiple perforations, or a long fistulous tract.

3270 QUANTIFICATION OF CARCINOEMBRYONIC ANTIGEN-LIKE ACTIVITIES IN NORMAL HUMAN GASTROINTESTINAL SECRETIONS.

(Eng.) Go, V. L. W.; Ammon, H. V.; Hoitermuller, K. H.; Krag, E.; Phillips, S. F. (Mayo Clinic, Rochester, MN 55901). *Cancer* 36(6):2346-2350; 1975.

Carcinoembryonic antigen-like (CEA-like) activity in gastrointestinal, pancreatic, and biliary secretions of 28 fasting normal men were quantified by using intestinal perfusion techniques, and the chromatographic and immunologic properties of the CEA-like material in these secretions were determined. CEA-like activity was detected at all levels of the gastrointestinal tract. The secretory rate from the colon was the highest (mean ± SE, 2.41 ± 2.0 μg/min), followed by that of pancreatobiliary and pancreatic secretions. The secretory rate from the stomach, duodenum, jejunum, and ileum was less than 20 ng/min. After perchloric acid extraction, the CEA-like material from the colon had the same chromatographic and radioimmunologic properties as [^{125}I]-CEA. These data suggest that the CEA-like material is normally secreted into the gastrointestinal tract, particularly into the colon.

3271 THE RADIOLOGIC DEMONSTRATION OF EARLY CHANGES IN ULCERATIVE COLITIS BY DOUBLE CONTRAST TECHNIQUE.

(Eng.) Laufer, I. (McMaster Univ. Medical Center, Hamilton, Ontario, Canada). *J. Can. Assoc. Radiol.* 26(2):116-121; 1975.

The double contrast technique was used in 70 patients to demonstrate radiologically early changes in ulcerative colitis. Twelve of the 70 patients were also examined with the flexible colonoscope, while all of the others were examined with the standard rigid sigmoidoscope. The radiologic diagnosis differed from the endoscopic findings in only 3 of 70 cases, even though the severity of disease in the rectosigmoid was often less than in more proximal portions of the bowel. In two patients with ulcerative proctitis where inflammation was limited to the distal 5-10 cm of rectum, the double contrast enema was normal. There were no complications attributable to the air contrast study. In a survey of patients who had previously been examined by a filled colon technique and subsequently by the double contrast technique, a majority of almost 2:1 found the air contrast study to be less distressing. The results indicate that subtle changes in the colonic mucosa due to medical treatment can be demonstrated by this method. It may be important for distinguishing between structural improvement in the bowel as opposed to the psychological well being that is induced by steroid treatment.

3272 LIPOPROTEIN X IN HEPATOBILIARY DISEASE. (Ger.) Mordasini, R. C.; Berthold, S.; Schlumpf, E.; Keller, H.; Riva, G. (Tiefenauspital, Tiefenaustrasse 112, CH-3004 Bern, Switzerland). *Schweiz. Med. Wochenschr.* 105(27):863-872; 1975.

The diagnostic and prognostic reliability of lipoprotein-X (Lp-X) in the diagnosis of cholestasis was evaluated in 80 patients with diseases of the liver and/or the biliary tracts, and in 103 subjects with various other diseases. The results of Lp-X detection were compared with the so-called "enzymes indicating cholestasis:" alkaline phosphatase, leucine arylamidase, and γ-glutamyltranspeptidase. Where possible, a histologic specimen of the liver was obtained. The correlation between Lp-X and enzymes indicating cholestasis was satisfactory in over 90% of the cases. When compared with the histologic findings, Lp-X proved to be more reliable than the enzymes. However, Lp-X did not show absolute specificity in the detection of cholestasis, as there were several negative results in cases with histologically proven cholestasis. Furthermore, the differentiation of intra- and extrahepatic cholestasis was not possible on the basis of Lp-X. In the control group, three were Lp-X-positive. Further investigations in these three patients revealed that primarily unsuspected hepatobiliary disease could not be ruled out. Follow-up of patients with hepatobiliary disease showed that the transition of Lp-X to negative indicated improvement of cholestasis 1-2 weeks earlier than using the enzymes mentioned above.

3273 THE RESPONSE OF THE LOCAL IMMUNOGLOBULIN SYSTEM TO MALIGNANT LESIONS OF THE STOMACH: A NEW DIAGNOSTIC TEST. (Eng.) Levy, M.; Petreshock, E. P.; Mandell, C.; Deysine, M.; Katzka, I.; Aufses, A. H., Jr. (Long Island Jewish-Hillside Medical Center, New Hyde Park, NY 11040). *Cancer* 36(6):1991-1995; 1975.

The response of the local secretory immunoglobulin system to tumor antigens was studied in 71 patients suspected of harboring a gastric malignancy. Gastric aspirates were obtained by fiberoptic endoscopy and measured on single radial immunodiffusion plates. Patients with malignant neoplasms of the stomach were divided into type I and type II lesions based upon the extent and stage of the disease. Secretory immunoglobulin (Ig) A titers were elevated in all patients with type I malignant tumor confirmed by histologic examination: mean, 43.8 mg/100 ml (standard deviation ± 40.6 mg/100 ml). Patients with type II malignant lesions, benign lesions or normal controls had significantly lower IgA titers: mean, 6.1 mg/100 ml (SD ± 3.7 mg/100 ml). This suggests that the host's response to malignant cells of the gastrointestinal system is an altered and elevated secretion of IgA. Evaluation of local immunoglobulin titers may be of value when used in conjunction with other diagnostic modalities in determining the nature of gastrointestinal lesions, particularly when the lesion is not metastatic or does not massively involve the gastric wall.

3274 ^{131}I ROSE BENGAL SCANNING AND CLEARANCE RATIOS IN THE INVESTIGATION OF JAUNDICED PATIENTS. (Eng.) Davies, E. R.; Morris, J. N.; Read, A. E.; Powell, N. (Univ. Dept. Medicine, United Bristol Hosps., U.K.). *Clin. Radiol.* 27(2):227-235; 1976.

The accuracy of the ^{131}I-rose bengal test in distinguishing between obstructive and nonobstructive jaundice was assessed in 70 jaundiced patients. Blood clearance traces, intestinal radioactivity traces, and serial abdominal scans were performed during a 3-hr period. The blood clearance ratios were not helpful discriminators, while the timing of intestinal radioactivity was the most helpful information. Its rapid appearance excluded mechanical obstruction. A delay of up to 3 hr in its appearance was characteristic of cholestasis. A delay of over 3 hr, found in all cases of mechanical obstruction, was also noted in 10 cases of severe cholestasis that could not be distinguished from those with mechanical obstruction. A follow-up examination within 10 days was of diagnostic value in two of these cases, and the overall accuracy of the test was 86%. It is concluded that the ^{131}I-rose bengal test is a helpful diagnostic discriminator in the great majority of patients with jaundice. It is offered as a screening procedure for specialized techniques.

3275 CORRELATION BETWEEN ISOTOPIC SCANNING AND PANCREATIC FUNCTION TESTS IN THE DIAGNOSIS OF PANCREATIC DISEASES: IMAGE AND DIGITAL COMPUTER TECHNIQUES. (Eng.) Fruhling, J.; Vincent, J. L.; Van der Hoeden, R.; Delcourt, A. (Institut J. Bordet, B-1000, Bruxelles, 1 rue Heger-Bordet, Belgium). *Int. J. Nucl. Med. Biol.* 2:145-152; 1975.

The effectiveness of the secretin-cerulein (or CCK) pancreatic function tests was compared with that of scintigraphy in 70 subjects to determine whether there is a correlation between the results of the two diagnostic methods. The Anger-camera was used for studying liver and gastrointestinal activity. The functional test measured secretory volume, bicarbonate concentration and output, and enzyme output, under secretin and pancreozymin stimulation. There was a good correlation between the final conclusion of functional investigation and the definitive protocol of the radionuclide pancreatic study. In 60 of the 70 cases (86%), results of both examinations were in agreement. Among the four functional parameters, the enzyme output showed results nearest to the scintigraphic image. Interpretation of results by evaluating the scintigraphic image and pancreatic function test has the advantage of correcting false positive results, which are obtained by either of the two methods used alone. In this study, there were no false negative results to be corrected. Thus, it is concluded that the two methods may have equal value in demonstrating pathologic findings of the pancreas.

3276 THE SIGNIFICANCE OF THERMOGRAPHY IN THE DIAGNOSIS OF ACUTE ABDOMINAL DISEASE. (Eng.) Peltokallio, P.; Svinhufvud, U.; Rantakaulio, M.; Varjoranta, K. (Univ. Helsinki, Haartmanink 4, Helsinki, Finland). *Amer. J. Roentgenol. Radium Ther. Nucl. Med.* 125(1):164-171; 1975.

The use of thermography in the diagnosis of acute appendicitis, acute cholecystitis, and abscesses in the abdominal cavity was investigated during the examination of 100 patients with acute abdominal disease. In 41 cases in the acute biliary group, thermography yielded findings supporting the diagnosis in 24 patients (59%), insignificant findings in 14 patients (34%), and findings that were misleading in 3 patients (7%). In the appendicitis group, thermographic results supported the diagnosis in 17 (63%), were insignificant in 6 (22%), and misleading in 4 cases (15%). In the abscess/tumor group, thermographic findings supported the diagnosis in 16 patients (50%), were insignificant in 11 patients (35%), and misleading in 4 patients (12%). Also, thermography was the sole source of diagnosis in the case of a 52-yr-old man with distinct signs suggesting a periappendicular abscess. There were nine tumors of the cecum and ascending colon in which a very clear thermographic finding supporting tumor diagnosis was obtained. All had palpable resistance in the lower right abdomen. Thermographic examination supported the tumor versus abscess diagnosis in half of the patients. In all three groups, misleading test results were obtained in patients who were obese and had thick abdominal covers. It is suggested that thermography has significance in the diagnosis of acute abdominal disease, as an aid to existing examinations. Thermography should also have an obvious application in the localization of postoperative suppurative foci.

3277 CONTRIBUTION OF ARTERIOGRAPHY TO THE DIAGNOSIS OF MALIGNANT TUMORS OF THE BILE DUCTS. (Fre.) Geindre, M.; Coulomb, M.; Marty, F. (C.H.U. de Grenoble, F 38700 La Tronche, France). *J. Radiol. Electrol. Med. Nucl.* 56(8/9):602-603; 1975.

3278 TECHNIQUES AND DIRECTIONS FOR RADIOLOGY OF THE BILE DUCTS. (Fre.) Erlinger, S. (Hopital Beaujon, F 92110 Clichy, France). *J. Radiol. Electrol. Med. Nucl.* 56(8/9):575-578; 1975.

3279 ROLE OF ECHOTOMOGRAPHY IN CASES OF JAUNDICE: DIAGNOSIS OF THE DILATION OF THE MAIN BILE DUCT AND OF THE INTRAHEPATIC BILE DUCTS. (Fre.) Weill, F.; Aucant, D.; Bourgoin, A.; Eisenscher, A.; Becker, J. C.; Kraehenbuhl, J. R. (Centre Hospitalier Universitaire, 2, place Saint-Jacques, F 25000 Besancon, France). *J. Radiol. Electrol. Med. Nucl.* 56(8/9):598-601; 1975.

3280 NON-OPACIFIED GALLBLADDER IN ORAL CHOLANGIOGRAPHY: MEANING AND DEFINITION OF A RADIOLOGICAL APPROACH. (Fre.) Bismuth, V.; Pouliot, Ph.; Jourde, A. M. (Hopital Ambroise-Pare, 9, avenue Ch.-de-Gaulle, F 92100 Boulogne, France). *J. Radiol. Electrol. Med. Nucl.* 56(8/9):608-609; 1975.

3281 BILIARY DYSKINESIA: MYTH OR REALITY? (Fre.) Levy, V. G. (Hopital Saint-Antoine, F 75012 Paris, France). *J. Radiol. Electrol. Med. Nucl.* 56(8/9):606-607; 1975.

3282 CHOLECYSTOGRAPHY IN CHILDREN. (Fre.) Fortier-Beaulieu, M.; Chaumont, P. (Hopital des Enfants Malades, 149, rue de Sevres, F 75015 Paris, France). *J. Radiol. Electrol. Med. Nucl.* 56(8/9):610-612; 1975.

3283 IS A NON-OPACIFIED GALLBLADDER INDICATIVE OF SURGERY? (Fre.) Grellet, J.; Picard, A.; Maillard, J. N. (Hopital Louis-Mourier, F 92600 Colombes, France). *J. Radiol. Electrol. Med. Nucl.* 56(8/9):609-610; 1975.

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3316 RECENT ADVANCES IN THE DIAGNOSIS OF SMALL EARLY CARCINOMAS OF THE STOMACH. (Rus.) Sokolov, Iu. N.; Usov, N. A.; Rokhlin, E. A. (Central Inst. Postgraduate Medicine, Moscow, USSR). *Vestn. Rentgenol. Radiol.* (2):5-18; 1975.

See also, 3073, 3342, 3343, 3344, 3407, 3410, 3477, 3484, 3488, 3490, 3523, 3524, 3526, 3545, 3554, 3560, 3562, 3566, 3648, 3665, 3666, 3667, 3678, 3680, 3681, 3682, 3703, 3704, 3708, 3709, 3718, 3752, 3780, 3786, 3805, 3811.

GASTROINTESTINAL DISEASES

ESOPHAGUS

3317 EPIDEMIOLOGY OF OESOPHAGEAL CANCER IN FRANCE: INCREASING MORTALITY AND PERSISTENT CORRELATION WITH ALCOHOLISM. (Eng.) Audigier, J. C.; Tuyns, A. J.; Lambert, R. (Hopital Edouard-Herriot, place d'Arsonval, F-69374 Lyon Cedex 2, France). *Digestion* 13(4):209-219; 1975.

The geographic distribution of esophageal carcinoma in France, its time trend, and a possible correlation with alcoholism were investigated. For the year 1967-1968, 10,237 deaths from esophageal cancer were reported in France. The disease was much more common in men, with the sex ratio of 12.88:1. For men, the incidence was particularly high in three western provinces: Normandie, Bretagne, and Pays de la Loire. From the years 1961-1963 to 1967-1968, an increase of 8% in the number of men afflicted with this disease was found for the whole of France. In women, the rate of incidence did not change. Correlation coefficients were calculated between esophageal cancer, cirrhosis, and alcoholism. These demonstrate a marked correlation in men with cirrhosis and alcoholism. The correlation found with alcoholism was higher and appeared in all age groups. In women, the result was not so clear, but there was a correlation with cirrhosis mortality in the age group 65-74. The relation of alcohol in the etiology of esophageal cancer in France is confirmed by this strong and persistent correlation between esophageal cancer mortality and mortality from cirrhosis and alcoholism. The mechanism by which alcohol consumption induces esophageal cancer is closer to that leading to alcoholism and alcoholic psychosis than to that resulting in liver cirrhosis. It is suggested that for cancer of the esophagus, alcohol may be one specific carcinogen.

3318 ESOPHAGEAL REFLUX--AN UNRECOGNIZED CAUSE OF RECURRENT OBSTRUCTIVE BRONCHITIS IN CHILDREN. (Eng.) Danus, O.; Casar, C.; Larrain, A.; Pope, C. E., II. (Hospital Roberto del Rio, Santiago, Chile). *J. Pediatr.* 89(2):220-224; 1976.

Forty-three children (aged 4 months-5 yr) with recurrent obstructive bronchitis but without prominent gastrointestinal symptoms were studied roentgenographically and by manometry for esophageal reflux. Roentgenographic evidence for reflux was observed in 26 patients; these patients had a mean lower esophageal sphincter (LES) pressure of 6.3 mm Hg as compared to a mean LES pressure of 21.9 mm Hg in 10 normal control infants. The remaining 17 patients had a mean LES pressure of 10.0 mm Hg, also significantly lower than that of control subjects. Fifteen of 20 patients with recurrent obstructive bronchitis noted alleviation of their pulmonary symptoms after medical treatment of their reflux. Sequential studies of another group of 21 patients with radiologically demonstrated reflux who were followed for 6 months showed increases in sphincter pressures and disappearance of radiologically observed reflux in one-third of the patients. It is suggested that esophageal reflux should be sought in patients with recurrent bronchitis, and that antireflux therapy might improve the pulmonary symptomatology.

3319 HIGH PEPTIC STRICTURE OF THE OESOPHAGUS. (Eng.) Davidson, J. S. (Bradford Royal Infirmary, Duckworth Lane, Bradford, West Yorkshire, BD9 6RJ, U.K.). *Thorax* 31(1):1-14; 1976.

A clinical account of high peptic stricture with the lower esophagus lined by columnar epithelium of gastric type, is reported in 57 patients. In 42 of the patients, the strictures were at the level of the aortic arch. In 15 patients, strictures were located not lower than midway between the aortic arch and the hiatus. There was little difference in symptoms between high and low strictures. Radiologically, most of the high strictures were short and smooth, but other types were also illustrated. Carcinoma and congenital mid-esophageal web were considered in the differential diagnoses. Duodenal ulcer was associated in 10% of the cases. A high stricture developed soon after an abdominal operation or period of recumbency in six patients. A Barrett ulcer was noted, in addition to a high stricture, in one patient. In one patient, the mucosa of the lower esophagus appeared to be replaced by jejunal mucosa, following esophagojejunostomy. A stricture was noted to be ascending the esophagus, over a period of 6 yr, in one patient. Treatment by dilatation was performed in 33 patients; 24 underwent surgery. Hernial repair appears to be an effective method of treatment when no pathology is found in the region of the pylorus and duodenum. However, if such pathology is present, it is suggested that vagotomy be included in the treatment procedure. Of the 19 patients who were treated with hernial repair, significant dysphagia persisted in 2 and slight dysphagia persisted in one.

3320 EFFECT OF PENTAGASTRIN AND GASTRIC ALKALINIZATION ON LOWER ESOPHAGEAL SPHINCTER PRESSURE IN DIFFUSE ESOPHAGEAL SPASM. (Eng.) Eckardt, V. F.; Holtermuller, K. H. (Lemuel Shattuck Hosp., 170 Morton St., Boston, MA 02130). *Digestion* 13(1/2):1-7; 1975.

The effect of i.v. pentagastrin and gastric alkalinization on the lower esophageal sphincter (LES) pressure was evaluated in seven patients with diffuse esophageal spasm and was compared with responses in nine normal controls. Injections of 0.2 and 0.4 μg pentagastrin/kg increased LES pressure significantly more in patients than in control subjects ($p<0.05$, $p<0.01$). Following gastric alkalinization with 5 ml of 0.1 N $NaHCO_3$/min (over 20 min), both groups showed increases in LES pressure, but these were significantly greater for patients with diffuse esophageal spasm ($p<0.05$) than for controls. The results indicate that the LES in patients with diffuse esophageal spasm is supersensitive to pentagastrin and gastric alkalinization.

3321 DIAGNOSTIC PROBLEMS OF STENOSING ESOPHAGITIS OF OBSCURE ORIGIN. (Cze.) Kralik, J.; Nieslanik, J. (KNsP, Ostrava 1, Zelena 55/18, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 29(2):107-112; 1975.

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3323 A RARE PEDICULATE TUMOR OF THE ESOPHAGUS. (Fre.) Gosselin, B.; Dupont, A.; Delacroix, R.; Delarue, J. (Laboratoire d'Anatomie Pathologique, C.H.U., 59000 Lille, France). *Ann. Chir. Thorac. Cardiovasc.* 14(2):181-183; 1975.

3324 ROENTGENOLOGICAL CHARACTERISTICS OF ESOPHAGOPLASTY WITH AN ANTIPERISTALTIC TRANSPLANT FROM THE GREATER CURVATURE OF THE STOMACH. (Rus.) Varshavskii, Iu. V.; Mamontov, A. S.; Starchenko, V. A.; Shekhter, Iu. I. (P. A. Gertsen Moscow Scientific Res. Inst. Oncology, Moscow, USSR). *Vestn. Rentgenol. Radiol.* (2):45-50; 1975.

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3329 CLINICO-ROENTGENOLOGICAL STUDY OF THE ESOPHAGUS IN PATIENTS FOLLOWING LARYNGECTOMY FOR CANCER. (Rus.) Pudenko, V. P.; Rozenfel'd, L. G.; Abyzov, R. A. (Kiev Scientific Res. Inst. Otolaryngology, Kiev, USSR). *Vrach. Delo* (8): 105-111; 1975.

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3334 ESOPHAGEAL CANCER AT ILLE-ET-VILAINE: STUDY OF THE INCIDENCE OF THE DISEASE, ITS CLINICAL AND HISTOLOGICAL ASPECTS, AND GEOGRAPHIC DISTRIBUTION. (Fre.) Tuyns, A. J.; Masse, G. (Centre International de Recherche sur le Cancer, 150, cours Albert-Thomas, 69008 Lyon, France). *Ouest Med.* 28(24): 1757-1770; 1975.

3335 SUPERIOR ESOPHAGEAL SPHINCTER: STATIC AND DYNAMIC CHANGES IN PATIENTS WITH GASTROESOPHAGEAL REFLUX. (Spa.) Benages, A.; Ridocci, M. T.; Mora, F.; Soria, T.; Molina, R.; Carbonell Canti, C.; Cosin, J. A.; Castellanos, G.; Parrilla, P. P. (Hospital Clinico Universitario de Valencia, Valencia, Spain). *Rev. Esp. Enf. Apar. Dig.* 47(1):1-10; 1976.

3336 MORPHOLOGICAL, DIAGNOSTIC AND THERAPEUTIC ASPECTS OF BARRETT'S SYNDROME. (Spa.) Guarner, V.; Aguirre, J.; Palomo, A. M.; Moran, F.; Degollado, J. R. (Hospital General del Centro Medico "La Raza," Mexico). *Rev. Esp. Enf. Apar. Dig.* 47(1): 11-22; 1976.

3337 DIAPHRAGMATIC HERNIAS WITH EARLY CLINICAL SYMPTOMS. (Fre.) Ponte, C.; Ribet, M.; Lequien, P.; Gosselin, B.; Flinois, C.; Marx, J. (Hopital A. Calmette, 59000 Lille, France). *Pediatrie* 30(5):533-544; 1975.

3338 GASTRIN LEVELS IN THE INHIBITED LOWER ESOPHAGEAL SPHINCTER. (Spa.) Varas, N. J.; Luque, M. T.; Mercader, J.; Nieto, B. (Hospitalet de

Llobregat, Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(5):523-534; 1976.

3339 CARDIOSPASM AS A SURGICAL PROBLEM. (Pol.) Tomkiewicź, A. (Instytut Chirurgii AM, 60-355 Poznan, ul. Przybyszewskiege 49, Poland). *Pol. Przegl. Chir.* 47(5):577-580; 1975.

3340 RESULTS OF PALLIATIVE SURGERY ON THE GASTROINTESTINAL TRACT. (Ger.) Schwemmle, K. (Chirurgische Klinik mit Poliklinik, Universitat Erlangen-Nurnberg, W. Germany). *Bull. Soc. Int. Chir.* 33(5/6):470-475; 1974.

3341 SOME CHARACTERISTICS OF THE PROTEIN AND AMINO ACID METABOLISM IN SURGICAL TREATMENT OF ESOPHAGEAL DISEASES. (Rus.) Shalimov, S. A.; Bogush, G. G. (Kiev Scientific Res. Inst. Clinical and Experimental Surgery, Kiev, USSR). *Klin. Khir.* (2):17-22; 1975.

See also, 3088, 3314, 3315, 3369, 3376, 3383, 3658, 3745, 3781.

STOMACH

3342 ENDOSCOPIC DIAGNOSIS OF ADVANCED GASTRIC CANCER: FACTORS INFLUENCING YIELD. (Eng.) Winawer, S. J.; Posner, G.; Lightdale, C. J.; Sherlock, P.; Melamed, M.; Fortner, J. G. (Memorial Hosp., 1275 York Ave., New York, NY 10021). *Gastroenterology* 69(6):1183-1187; 1975.

Factors that influence diagnostic yield by directed endoscopic biopsy and cytology were studied in 50 patients with advanced gastric cancer, using a forward-viewing panendoscope. Cytological and/or histological confirmation of carcinoma was obtained in 92% of the 26 exophytic tumors but in only 50% of the 24 that were infiltrative, for an overall diagnostic yield of 72%. There was a positive yield of 85% for brush cytology alone compared to 65% for biopsy alone, in exophytic lesions; and there was a positive yield of 50% for brush cytology alone compared to 33% for biopsy alone, in infiltrative lesions. The overall yield for brush cytology alone was 68% compared to 50% for biopsy alone. The lesions that provided non-diagnostic tissue were mostly recurrent or infiltrative cancers, and were most often in the cardia, antrum, or were of the linitis plastica type. The combination of infiltrative character and location in antrum or cardia, especially if recurrent, often resulted in nondiagnostic biopsy and cytology specimens. It is concluded that currently available fiberoptic endoscopes generally provide a fairly high degree of diagnostic accuracy for certain types of gastric cancers and that addition of cytological techniques has also increased the diagnostic yield.

3343 VARIATION IN DISTRIBUTION OF ANTRAL GASTRIN CELLS. (Eng.) Asnoes, S.; Johansen, A. (Bispebjerg Hosp., DK-2400 Copenhagen NV, Denmark). *Acta Pathol. Microbiol. Scand. (A)* 83(6):737-738; 1975.

The variation in distribution of gastrin-producing cells was studied by an immunoperoxidase technique in biopsy specimens from 65 patients with gastric disorders. The number of gastrin cells varied considerably in the pyloric mucosa. Illustrations of four biopsies taken from a small area of antral mucosa in a patient with atrophic gastritis are presented; the number of gastrin cells varies from 1 to 165 per biopsy. It is concluded that estimating the gastrin cell mass from a small number of biopsies is very difficult and that the variation of the number of cells at different stages of gastritis must be determined.

3344 PRACTICAL SIGNIFICANCE OF GASTRIC RUGAL FOLDS. (Eng.) Press, A. J. (Lankenau Hosp., Lancaster and City Line Ave., Philadelphia, PA 19151). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(1):172-183; 1975.

The practical value of gastric fold assessment was studied in 33 cases of gastric carcinoma and in 47 cases of gastric or duodenal ulcer. Older patients with carcinomas fell into the lowest atrophic grouping; however, younger patients (below 60 yr of age) with carcinomas may have rugose stomachs, a condition that is more commonly found in the elderly patient. In normal patients, some proportionality of gastric folds to acid output was found to exist. Such a correlation may also be present in cases of peptic disease of the distal stomach or duodenum. A local area of gastric fold exaggeration reflected tumor or inflammation in specific cases. Hyperrugosity with a "bland" duodenum suggested underlying chronic mucosal disease, possibly of diverse etiology, but with low acid output, as contrasted with the "reactive" duodenum reflecting a more normal or increased acid output. Gastric atrophy consistently aroused a high suspicion of any lesion, especially in the diagnosis of "chronic peptic scarring." A possible upper limit of "physiologic" fold thickness was reported at 4 to 5 mm, beyond which an additional pathologic process was inferred. It is suggested that hypertrophic gastritis and gastric body ulcer disease may illustrate this progression and possibly share similar underlying mucosal pathology and rugal characteristics.

3345 THE EFFECT OF BETA-ADRENERGIC BLOCKADE UPON BASAL AND PENTAGASTRIN-STIMULATED GASTRIC ACID SECRETION AND UPON GASTRIN RESPONSE TO FOOD. (Eng.) Kronborg, O. (Bispebjerg Hosp., Kajerodvej 124, 3460 Birkerod, Denmark). *Scand. J. Gastroenterol.* 10(7):757-762; 1975.

The effects of β-adrenergic blockade with propanolol on the spontaneous and maximum gastric acid secretion and on gastrin response to food were investigated in normal subjects and in duodenal ulcer patients. In spontaneous secretion studies, propanolol did not affect acidity, and the total acid output during 2 hr after propanolol was similar to that before the drug was administered. The pulse rate was significantly decreased. In spite of a significant β-adrenergic blockade, maximum secretion was not changed by 5 mg propanolol. At 10 mg, a reduction in maximum acid output was seen in all of seven healthy subjects and in four of five ulcer patients. However, acidity changes were insignificant. Serum gastrin concentrations in normal subjects after food ingestion were insignificantly higher after propanolol during the period from 140 to 210 min. However, at 210 min this difference became significant. The 5 duodenal ulcer patients had a higher gastrin response than the 10 normal subjects, but the response after propanolol and placebo were not significantly different. Blood glucose concentrations increased to the same degree after food in both normal and ulcer subjects. The results support a stimulation of β-receptors during pentagastrin infusion. The insignificantly higher gastrin concentration after a meal, during β-blockade, suggests a reduced antral suppression by acid causing a gastrin release. An adrenergic gastrin response to food, which may be inhibited by β-bloackage, was not demonstrated in this study. Gastrin response to food was apparently not directly related to activation of β-adrenergic receptors.

3346 GASTROINTESTINAL CANCER: ITS GEOGRAPHIC DISTRIBUTION AND CORRELATION TO BREAST CANCER. (Eng.) Jansson, B.; Seibert, G. B.; Speer, J. F. (M.D. Anderson Hosp. and Tumor Inst., Houston, TX). *Cancer* 36(6):2373-2384; 1975.

Maps of mortality rates in all U.S. counties for cancer of the stomach, colon, and rectum are presented and the relation between large bowel cancer and all other cancer sites is analyzed in terms of geographic distribution and geographic variation. Highest colon and rectum cancer rates are concentrated in the northeast and north central United States with the Ohio River as an especially sharp boundary between high and low rate counties. The distribution rates of stomach cancer are particularly high in New Mexico, North Dakota, and around Lake Superior. This supports the possibility of chemical protectors (e.g., selenium), which affect the rates of colon and rectum cancers in the United States. The urban-rural differences, which had been observed in the past, are not readily apparent. Evaluation of all cancer sites demonstrates that the geographic dependence was highest for organs most exposed to the environment, such as the organs along the alimentary canal, and it is lowest for unexposed organs such as prostate, pancreas, and brain. The correlation coefficients between mortality rates for cancer of different organ sites are grouped in subsets with high correlations for each pair in the same subset. Cancers of colon, rectum, and breast are highly correlated in United States data as well as in international data. The analyses suggest that new epidemiologic studies may be helpful in further elucidating the interrelation between the factors suspected to be involved in the cause of large bowel cancer.

3347 GASTRIC ULCER AND CANCER. (Eng.) Montgomery, R. D.; Richardson, B. P. (East Birmingham Hosp., Birmingham, B9 5ST, England). *Q. J. Med.* 44(176):591-599; 1975.

The incidence of gastric carcinoma was studied in a series of 210 patients presenting with apparently benign gastric ulcer. Ten cases underwent immediate surgery. The remainder, most of whom were treated with carbenoxolone, were followed up as outpatients for periods of 2-13 yr. During this time, additional 75 patients had elective surgery. In all, there were 78 gastrectomies and 7 vagotomies with pyloroplasty. In nine cases, carcinoma was diagnosed within 18 months and was almost certainly present from the outset. Superficial spreading carcinoma was detected by histology, four cases after routine gastrectomy, which revealed no gross evidence of malignancy. Four cases of unsuspected superficial spreading carcinoma were found in a total of 74 gastrectomy specimens. Altogether, 8 cases of carcinomatous ulcer were initially misdiagnosed in a series of 210. In five of these patients operation was delayed for more than 3 months. The 5-year death rate due to gastric carcinoma was 3.2% for the whole series. The operative mortality for elective surgery was 1.3%. The mean follow-up was 5.7 yr for the remaining 201 cases. Three fresh cases of gastric carcinoma were found, and in two of these, the cancer was at a different site from the ulcer. The 5-yr incidence of fresh gastric carcinoma was 0.6%. Unsuspected superficial spreading carcinoma was detected by histology in 5.4% of gastrectomy specimens. It is concluded that there is a need for vigilance, both in family practice and in hospital, in the detection and assessment of fresh gastric ulcers at the earliest stage of their evolution.

3348 GASTRIC ULCER AND CARCINOMA IN FUNDIC GLAND AREA. (Eng.) Yamagiwa, H.; Ishihara, A.; Hamazaki, M. (Mie Univ., Sch. Medicine, 174 Edobashi 2-chome, Tsu, Japan). *Gastroenterol. Jpn.* 10(4):290-299; 1975.

The clinicopathologic findings of the ulcer and carcinoma in the fundic gland area are compared with those in the pyrolic gland area in surgically resected tissue. The frequency of ulcer in the fundic gland area was 8.2% in 2,194 cases of gastric ulcer and that of carcinoma was 8.4% in 780 cases of gastric carcinoma. Both diseases showed high frequency in the 40-50 yr age group, and were common in females. Ulcers in the fundic gland area usually showed high acidity and high frequency of massive bleeding, as melena and hematemesis in 19 of 82 cases (23%). In contrast, in carcinoma of the fundic gland area, the acidity was usually low and the massive bleeding was seen in 20%. The ratio of low differentiated carcinomas to well differentiated ones was about 3.7:1 in the fundic gland area and 1:1.3 in the pyrolic gland area. The frequency of early gastric carcinomas was 27% and 41% in the fundic and pyrolic gland areas, resp. In the fundic gland area, as in the pyrolic gland area, the low differentiated carcinomas usually occurred on the nonmetaplastic mucosa and the majority of well differentiated ones were found in association with the intestinal metaplasia. Although the solitary carcinoma in the anterior wall or greater curvature was observed, the solitary ulcer was not found in these sites in this series. The results indicate that the pathology of ulcers in the fundic area is similar to that of ulcers in the pyrolic gland area.

3349 GANGLIOSIDE PATTERN AND NEURAMINIC ACID CONTENT OF HUMAN GASTRIC AND COLONIC CARCINOMA.

(Eng.) Keranen, A.; Lempinen, M.; Puro, K. (Dept. Medical Chemistry, Univ. Helsinki, Siltavuorenpenger 10A, SF-00170 Helsinki 17, Finland). *Clin. Chim. Acta* 70(1):103-112; 1976.

The ganglioside pattern of 25 human gastric and 11 human colonic adenocarcinomas was analyzed to determine whether the ganglioside pattern and neuraminic acid content of human malignant tissue differ from those of normal tissue. Most of the gastric tumors and all of the colonic tumors contained about four times more lipid-bound neuraminic acid, i.e., gangliosides, than corresponding normal tissue. The ganglioside pattern seemed normal in all of the tumors. No differences were found between the ganglioside compositions of human gastric and colonic adenocarcinomas and corresponding normal mucosas. The total amount of gangliosides was increased about fourfold in malignant tissues. The amount of protein-bound neuraminic acid was higher (up to 22.6 μmol/100 g) than normal in all gastric carcinomas examined. In the colon carcinomas, it was high in most, but low in some ranging from 170 to 814 μmol/100 g (normal=310 μmol/100 g). The ratio of lipid-bound neuraminic acid content (L) to protein-bound neuraminic acid content (P) was chosen as the common denominator for the grouping of the carcinoma material. The six gastric carcinomas with an L/P ratio lower than normal gastric mucosa (<2.5%) were significantly larger than those having an L/P ratio within normal limits (2.5-4.4%) or higher (>4.4%) than normal tissue. In this group, the content of protein-bound neuraminic acid was increased, as in the total material, but the content of lipid-bound neuraminic acid was decreased. The relevance of these findings is not clear at present.

3350 HETEROGENICITY IN SUSCEPTIBILITY TO CHRONIC GASTRITIS IN RELATIVES OF GASTRIC CANCER PATIENTS WITH DIFFERENT HISTOLOGY OF CARCINOMA.

(Eng.) Kekki, M.; Ihamaki, T.; Sipponen, P.; Hovinen, E. (Dept. Medicine, Haartmaninkatu 4, 00290 Helsinki 29, Finland). *Scand. J. Gastroenterol.* 10(7): 737-745; 1975.

The morphological state of gastric body mucosa was examined in 269 first degree relatives of 64 index patients with gastric carcinoma and in 142 randomly selected subjects. Gastric carcinoma was divided into three groups according to histological properties: carcinoma mucocellulare, carcinoma adenomatosum, and carcinoma anaplasticum. The state of gastric body mucosa was divided into five states: normal, superficial gastritis, slight, moderate, and severe atrophic gastritis. The results were subjected to numerical analysis based on the stochastic theory. The term age-adjusted score (AAS) was used to define the individual susceptibility to chronic gastritis. In terms of AAS, the material was divided into high and low gastritis risk families. The subjects belonging to carcinoma mucocellulare index patient families had a significantly higher ($p<0.01$) susceptibility to chronic gastritis than the other relatives examined. These families were also significantly ($p<0.001$) concentrated in the group of high risk families. It is suggested that the heterogeneity of the relatives of gastric cancer patients, as regards their gastritis risk, should be taken into account in future epidemiological studies. These findings constitute further justification of the genetic approach in studies of the gastritis-gastric cancer relationship.

3351 GASTROINTESTINAL CHANGES IN PATIENTS WITH HYPOGAMMAGLOBULINEMIA.

(Eng.) Horoszek-Maziarx, S.; Kryszewski, A.; Lehman-Borowska, J.; Rynkiewicz, H.; Bardzik, I.; Krupa-Wojciechowska, B. (Inst. Internal Medicine, Medical Acad. in Gdansk. Gdansk, Poland). *Pol. Med. Sci. Hist. Bull.* 15/3(5/6):561-566; 1975.

Three cases of hypogammaglobulinemia are described. In all cases, the first symptoms of disease were pulmonary infections preceded by diarrhea. Diarrhea could have been caused by changes in the stomach as well as in the small intestine. Histamine fast anacidity was found and biopsy examinations of gastric mucosa disclosed atrophic gastritis. The strikingly thin gastric mucosa, devoid of parietal and chief cells, made it similar to the mucosa of the small intestine. In the first case, there was an increased number of lymphatic nodules in large parts of the digestive tract, usually without or with only small germinative centers. The xylose test and glucose loading test showed normal values. Schilling's test demonstrated impaired intestinal absorption of vitamin B_{12}. In all patients, there was a low iron level in the serum and a flat curve of serum iron after oral loading; the normal iron binding capacity by the serum indicated impairment of intestinal absorption. There was an absence of immunoglobulin (Ig) A in the serum; this may be the primary common cause of digestive tract changes, since IgA is the main Ig secreted into the digestive tract lumen, and plasma cells in the intestinal mucosa are its principal source. It is concluded that in patients with primary hypogammaglobulinemia showing mainly IgA deficiency, disturbances are found in the structure and functions of the digestive tract with atrophic gastritis, histamine fast anacidity, and impaired intestinal absorption.

3352 EFFECTS OF PARENTERAL ALIMENTATION ON POSTOPERATIVE GASTRIC FUNCTION. (Eng.)

Byrd, H. S.; Lazarus, H. M.; Torma, M. J. (Univ. Utah Medical Center, 50 North Medical Drive, Salt Lake City, UT 84132). *Am. J. Surg.* 130(6):688-693; 1975.

The effects of parenteral hyperalimentation on postoperative gastric function were studied in 11 patients undergoing abdominal aortic surgery. Five patients received standard isotonic postoperative i.v. solution, vitamins, and an electrolyte solution. The other six received parenteral FreAmine® and hypertonic glucose solution, providing 2,500 kcal and 16 g nitrogen/day. A positive nitrogen balance was accomplished in patients in the hyperalimented group. Excluding patients with gastric bleeding, gastric cell exfoliation rates were similar between patients in control (8.5×10^5 cells/min) and hyperalimented (8.9×10^5 cells/min) groups both pre- and postoperatively. In the three patients who had gastric bleeding on the third postoperative day, the corresponding abrupt increase in exfoliation rates of two of the patients to 8.5×10^6 cells/min a slough or shed of injured gastric surface epithelial cells. In response to the stress of surgery, a marked decrease occurred in gastric volumes of all patients, from 80.6 to 12.8 ml/hr for controls and from 68.9 to 6.5 ml/hr for hyperalimented patients. Total acid secretion was generally decreased in both groups, but was less clearly differentiated. However, hyperalimented patients had a gradual increase in acid secretion, achieving normal range between the third and fourth postoperative days. Control subjects were less predictable. Thus, it appears that the postoperative patient can be placed in positive nitrogen balance, and the stress of surgery apparently does not alter gastric cell exfoliation rates as long as the basic nutritional requirements are provided. However, in the postoperative semistarved patient, some derangement of the protective mucosal mechanism or the basic metabolic processes of the surface epithelial cells exists. It is concluded that parenteral hyperalimentation augments gastric mucosal regeneration, allowing for more physiologic secretory patterns and the maintenance of the protective gastric mucosal mechanism.

3353 JEJUNOGASTRIC INTUSSUSCEPTION FOLLOWING GASTRIC SURGERY. REVIEW OF THE LITERATURE AND REPORT OF TWO CASES. (Eng.)

Makris, G.; Galanis, N.; Koutsikos, S.; Giannakos, V.; Dalainas, V. (Univ. Thessaloniki, Medical Sch., Thessalonika, Greece). *Chir. Gastroenterol.* 9(1):93-98; 1975.

Two cases of jejunogastric intussusception following gastric surgery are presented. The two male patients presented, 14 and 20 yr resp., after Billroth II gastrectomy with epigastric pain and vomiting of food, bile, and blood. Gastrotomy was necessary only in the first patient. In this patient, there was invagination of the efferent loop, and the intussuscepted loop was long. The second patient underwent surgery 3 yr previously to correct rapid gastric emptying, and three nylon sutures encircling the serosa were used to constrict the lumen. The common feature, in both cases, was the massive hematemesis in the absence of melena. Both patients have maintained good health, following reduction of hematemesis.

3354 GASTRIC MUCOSA AFTER PARTIAL GASTRECTOMY. (Eng.)

Pulimood, B. M.; Knudsen, A.; Coghill, N. F. (West Middlesex Hosp., Isleworth, Middlesex, TW7 6AF England). *Gut* 17(2):463-470; 1976.

Histological changes in the body mucosa of the gastric remnant were investigated in 146 patients with peptic ulcer 2 yr after partial gastrectomy. Postoperative gastric biopsy specimens were compared with those at the time of operation. Of 138 patients without body atrophic gastritis (AG) before operation, this condition was found in 74 ($p<0.005$) 2 yr after operation [46% of duodenal ulcer (DU) patients and 73% of gastric ulcer (GU) patients]. The difference in the postoperative rates of AG in DU and GU was significant ($p<0.025$). The difference in the postoperative rates of AG in DU patients and in those with body GU was significant ($p<0.025$). Those with antral or pyloric canal ulcers were particularly liable to develop AG (81%). There was a marginally lower incidence of AG after ordinary Polya partial gastrectomy, when a Hofmeister value was incorporated ($p>0.05$). In DU's, there was a higher incidence of AG 2 yr after operation in men (51%) than in women (33%, $p>0.05$). A similar ratio was found for metaplasia in DU's (46% and 37%, resp.). There was an even chance of developing hypochromic anemia associated with AG, but at the time of biopsy, 88% of patients with AG were not anemic. Gastric parietal cell antibodies were not found in any patient with AG. The results indicate that there is no particular relation between the type of operation and age, postoperative appetite, body weight dumping, and diarrhea.

3355 USE OF ROUX-EN-Y DIVERSION OF DUODENAL SECRETIONS IN THE TREATMENT OF REFLUX GASTRITIS. (Eng.)

Bushkin, F. L.; Wickbom, G.; Woodward, E. R. (Coll. Medicine, Univ. Florida, Gainesville, FL 32610). *South. Med. J.* 69(2):132-137; 1976.

Roux-en-Y diversion of duodenal secretions was evaluated as treatment for postoperative reflux gastritis in 15 patients. All patients underwent surgery originally for benign ulcer disease; seven had a Billroth II gastric resection, six had a Billroth I gastric resection, and two had a vagotomy and pyloroplasty. Three of the patients had Henley jejunal loop interpositions, but their symptoms continued. The time between initial operation and the Roux-en-Y technique ranged from 1 to 22 yr. All patients showed marked subjective improvement within the first few weeks after operation. The hypochlorhydria or achlorhydria, which was present before revision, was essentially unchanged. Gross endoscopic improvement of the gastric remnant was noted in all 15 patients. Biopsy revealed a return to a more normal gastric mucosa in 14 of the 15 patients. It is concluded that the Roux-en-Y procedure is a technically simple method, has a low morbidity, and provides dramatic, expeditious relief of symptoms. After this procedure is performed, further revisional surgery is rarely necessary.

3356 SELECTIVE AND HIGHLY SELECTIVE VAGOTOMY WITH AND WITHOUT GASTRIC DRAINAGE. (Eng.) Cooperman, A. M. (Cleveland Clinic, Cleveland, OH). *Cleveland Clin. Q.* 43(2):51-60; 1976.

Two surgical procedures, selective gastric vagotomy (total gastric denervation) and highly selective vagotomy (partial gastric denervation) are reviewed. The advantages of selective vagotomy over truncal vagotomy include better results with postoperative Hollander tests and less diarrhea. In addition, there is a higher incidence of dumping and a drainage procedure may be omitted if obstruction is absent. Patients who undergo this procedure should be followed closely because gastric stasis requiring a drainage procedure may develop. After highly selective vagotomy, a newer operation, the results of secretory studies are satisfactory and there is a very low incidence of diarrhea, dumping, and other gastrointestinal complications when compared to other ulcer operations. However, the longest follow-up has been only 4 yr so its long-term value has not yet been evaluated.

3357 ACID-PRODUCING FUNCTION OF THE GASTRIC REMNANT IN PATIENTS WITH POSTGASTRECTOMY SYNDROMES. (Rus.) Mareev, Iu. S.; Bershadenko, D. D.; Goldin, V. A.; Korzh, N. I. (Moscow Medical Inst. of Stomatology, Moscow, USSR). *Khirurgiia (Mosk.)* (6):14-19; 1975.

3358 DIAGNOSIS OF MORPHOLOGICAL TYPES OF CHRONIC GASTRITIS. (Rus.) Salupere, V. P.; Maaroos, Kh. G.; Viirsalu, V. T. (Dept. Therapy, Tartu Univ., Tartu, Estonia). *Ter. Arkh.* 47(2):52-56; 1975.

3359 MASSIVE HEMORRHAGE AFTER GASTRIC RESECTION. (Rus.) Aleksandrovich, G. L. (Khabarovsk Medical Inst., Khabarovsk, USSR). *Klin. Khir.* (11):71-74; 1975.

3360 IS THERE A FEEDBACK MECHANISM BETWEEN SERUM GASTRIN CONCENTRATION AND GASTRIN RELEASE? (Ger.) Pointner, H.; Flegel, U.; Kopsa, H.; Pils, P.; Schmidt, P.; Zazgornik, J. (1. Medizinische Universitatsklinik, Lazarettgasse 14, A-1097 Vienna, Austria). *Wien. Klin. Wochenschr.* 88(2):62-66; 1976.

3361 EROSIVE GASTRITIS. (Ger.) Schmid, E. (Kaiser-Franz-Joseph-Spital, Patholog.-bakteriol. Institut, Kundratstrasse 3, A-1100 Vienna, Austria). *Wien. Med. Wochenschr.* 126(4):36-40; 1976.

3362 DEMONSTRATION OF PREDISPOSITION TO DUMPING SYNDROME AND CERTAIN PROBLEMS OF ITS PROPHYLAXIS. (Rus.) Udod, V. M.; Antonov, A. M.; Dundiak, R. P. (Tselinograd Medical Inst., Tselinograd, USSR). *Klin. Khir.* (11):33-36; 1975.

3363 INTRODUCTION OF EMULSIFIED FAT THROUGH PROBE AFTER GASTRIC RESECTION. (Rus.) Dugina, V. M. (Vladivostok Medical Inst., Vladivostok, USSR). *Khirurgiia (Mosk.)* (12):95-97; 1975.

3364 GASTRIC STUMP CANCER. (Spa.) de Arzua Zulaica, E. (No affiliation given). *Res. Esp. Enf. Apar. Dig.* 47(1):47-84; 1976.

3365 POSTOPERATIVE ALIMENTARY DYSTROPHY. (Rus.) Sakharov, M. I.; Slepukha, A. G. (Sverdlovsk Medical Inst., Sverdlovsk, USSR). *Klin. Khir.* (11):41-44; 1975.

3366 GASTRIC MUCOSA RELIEF IN PATIENTS WITH CHRONIC RENAL INSUFFICIENCY (ROENTGEN-ENDOCRINOLOGICAL AND MORPHOLOGICAL PARALLELS). (Rus.) Rabkin, I. Kh.; Rabotyl'skii, G. V.; Sarkisian, R. S.; Safronov, I. I. (All-Union Scientific Res. Inst. Clinical and Experimental Surgery, USSR Ministry of Health, Moscow, USSR). *Sov. Med.* (3):26-30; 1975.

3367 AUTORADIOGRAPHIC STUDY OF THE SCIRRHOUS CARCINOMA OF THE STOMACH IN MAN IN CASE OF CULTIVATION IN DIFFUSE CHAMBERS. (Rus.) Krutova, T. V.; Aksiutina, M. S.; Lipchina, L. P.; Korman, D. B. (Inst. Chemical Physics USSR Acad. Sciences, Moscow, USSR). *Biull. Eksp. Biol. Med.* 79(6):83-85; 1975.

3368 FUNCTIONAL STATE OF THE STOMACH IN PATIENTS WITH DIFFUSE TOXIC GOITER AND HYPOTHYROIDISM. (Rus.) Mukhamadieva, G. A. (Clinic Endocrinology, Makeevka, Donets Oblast, USSR). *Vrach. Delo* (6):22-25; 1975.

3369 RARE CAUSES OF ACUTE GASTRIC HEMORRHAGE. (Rus.) Petrova, N. N. (Moscow Medical Inst. Stomatology, Moscow, USSR). *Vestn. Khir.* 114(6):43-47; 1975.

3370 AN EXPERIENCE WITH SURGICAL TREATMENT OF CANCER OF THE CARDIA. (Rus.) Napalkov, P. N.; Baskakova, Z. I. (Leningrad Inst. Hygiene and Medicine, Leningrad, USSR). *Vestn. Khir.* 114(6):36-43; 1975.

3371 INVESTIGATION OF THE GASTRIC SECRETORY FUNCTION AND ASPIRATION BIOPSY. (Rus.) Shlykov, I. A. (Kiev Scientific Res. Inst. Clinical and Experimental Surgery, Ukrainian SSR Ministry Health, Kiev, USSR). *Vrach. Delo* (5):84-87; 1975.

3372 ISOLATED GRANULOMATOUS GASTRITIS. (Fre.) Barbier, P.; Kennes, B.; Ley, R.; Bollaert, A.; Parmentier, R. (Hopital universitaire Saint-Pierre, rue de l'Ermitage 46, B-1050 Brussels, Belgium). *Acta Gastroenterol. Belg.* 39(1/2):33-41; 1976.

3373 PROPHYLAXIS AND SURGICAL TREATMENT OF INFLAMMATORY "POSTGASTRECTOMY SYNDROMES" ("POSTGASTRIC INCONTINENCE" SYNDROMES). (Spa.) Narbona, B.; Villalba, R. (Hospital Provincial de Valencia, Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(5):547-584; 1976.

3374 PEROPERATIVE CONTROL OF GASTRIC ACIDITY DURING ULTRASELECTIVE VAGOTOMIES [Letter to Editor]. (Fre.) Cuilleret, I.; Picq, P.; Colas, M.; Le Pivert, P.; Gounot, R. (Hopital Bellevue, F 42100 Saint-Etienne, France). *Nouv. Presse Med.* 4(43):3073; 1975.

3375 ULTRASELECTIVE VAGOTOMY FOLLOWED BY FUNDOPLICATION. (Fre.) Picaud, R.; Anfossi, G.; Baki, N. (Hopital Nord, chemin des Bourrelys, 13326 Marseille Cedex 3, France). *Nouv. Presse Med.* (40):2881-2882; 1975.

3376 DIAGNOSIS AND TREATMENT OF GASTRIC PHLEGMON. (Rus.) Gushcha, A. L.; Minkov, S. I. (Riazan Medical Inst., Riazan, USSR). *Khirurgiia (Mosk.)* (6):47-52; 1975.

3377 X-RAY DIAGNOSIS OF THE AFFERENT LOOP SYNDROME. (Rus.) Neiman, M. I. (N. I. Pirogov II. Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk).* (6):52-57; 1975.

3378 POLYPOSIS OF ANASTOMOSIS AS CAUSE OF AFFERENT LOOP SYNDROME. (Rus.) Bulgakov, G. A.; Grafskaia, N. D.; Glabai, V. P. (A. V. Vishnevskii Inst. Surgery, Moscow, USSR). *Khirurgiia (Mosk.)* (6):57-60; 1975.

3379 POLYPOUS GASTRITIS AND DEEP CYSTIC GASTRITIS IN THE ZONE OF GASTROENTERO-ANASTOMOSIS. (Spa.) Drut, R.; Velasco Vela, O. (Catedra de Patologia, Facultad de Medicina, La Plata, Spain). *Arch. Fund. Roux-Ocefa* 8(1/4):173-180; 1974.

3380 THE "BAGPIPE" STOMACH, A FORM OF ORGAN NEUROSIS. (Ger.) Schneider, V. (Krankenhaus Warstein, 4788 Warstein, Germany). *Fortschr. Rontgenstrahl.* 124(4):335-338; 1976.

3381 MENETRIER'S DISEASE [Abstract]. (Eng.) Castrup, H. J.; Holscher, M.; Siewert, R. (Klinik fur Allgemeinshirurgie der Universitat Gottingen, W. Germany). *Langenbacks Arch. Chir.* 339:649; 1975.

3382 SIMPLE PERFUSION PUMP FOR GASTROINTESTINAL MANOMETRY [Abstract]. (Eng.) Koelz, H. R.; Brandli, H. H.; Blum, A. L. (Stadtspital Triemli, DH-8063 Zurich, Switzerland). *Lancet* 2(7944):1075; 1975.

3383 CANCER OF THE ALIMENTARY TRACT IN THE SUDAN: A STUDY OF 546 CASES. (Eng.) Malik, M. O. A.; Zaki El Din, Z. A.; El Masri, S. H. (Faculty Medicine, Univ. Khartoumn, P. O. Box 102, Khartoum, Sudan). *Cancer* 37(5):2533-2542; 1976.

3384 POSTOPERATIVE GASTRITIS CAUSED BY REFLUX. (Fre.) Loup, P.; Fontolliet, Ch.; Mosimann, R. (Centre hospitalier universitaire vaudois, CH-1011, Lausanne, Switzerland). *Helv. Chir. Acta* 42(4):535-538; 1975.

3385 ETIOPATHOGENESIS AND CLINICAL PICTURE OF THE DUMPING SYNDROME. (Pol.) Schabowski, J.; Pokora, J. (Inst. Internal Diseases Acad. Medicine, ul. Jaczewskiego 8, 20-950 Lublin, Poland). *Pol. Tyg. Lek.* 30(21):921-923; 1975.

See also, 3107, 3111, 3115, 3237, 3238, 3260, 3264, 3273, 3286, 3296, 3297, 3299, 3303, 3312, 3313, 3316, 3324, 3325, 3332, 3335, 3388, 3393, 3394, 3403, 3404, 3407, 3412, 3413, 3425, 3426, 3450, 3735, 3737, 3739, 3745, 3775, 3790, 3791, 3797, 3818.

STOMACH

Peptic Ulcers

3386 RESPONSE TO JEJUNAL ACIDIFICATION IN MAN. I. CHANGES IN COMPOSITION OF PERFUSATE. (Eng.) Thjodleifsson, B.; Wormsley, K. G. (Dept. Therapeutics, Univ. Dundee, Dundee, Scotland). *Scand. J. Gastroenterol.* 11(3):273-281; 1976.

The jejunal reaction to intraluminal acid was studied in 11 control subjects and in 12 duodenal ulcer patients. The study revealed that the human jejunum can dispose of large amounts of acid, and that the mechanism whereby acid is removed from the jejunal lumen involves buffering with bicarbonate secreted by the jejunal mucosa. Results indicate that the rate of secretion of bicarbonate into the jejunum is determined, in some manner, by the magnitude of the intraluminal stimulus provided by the acid, but that the maximal capacity to secrete bicarbonate per unit length of jejunum is limited. The amounts of bicarbonate, which can be secreted by 30 cm of jejunum, are not much different from the amounts of bicarbonate secreted by the pancreas in response to the same amounts of acid. The study confirmed earlier results that bicarbonate concentrations of up to 120 mmol/l may be required to account for the observed removal of acid and that the total calculated ionic composition of the net secreted fluid may be as high as 600 mmol/l, so that the secreted fluid is apparently hypertonic to extracellular fluid. It is concluded that the whole of the upper small intestine responds abnormally to acid. Whether the abnormal response of the small intestine to acid in patients with duodenal ulcer is secondary to the gastric hypersecretion and consequent excessive acidification of the small intestine is not known. It is also unclear whether the abnormal gastric secretory patterns in duodenal ulcer are secondary to the small intestinal dysfunction, because the abnormal intestine releases too little gastric inhibitor or an excessive amount of stimulation of the stomach, or whether both gastric and small intestinal dysfunction are common manifestations of an underlying pathophysiological state.

3387 24-HOUR CONTROL IN INTRAGASTRIC ACIDITY BY CIMETIDINE IN DUODENAL-ULCER PATIENTS.

(Eng.) Pounder, R. E.; Williams, J. G.; Milton-Thompson, G. J.; Misiewicz, J. J. (Central Middlesex Hosp., Park Royal, London NW10 7NS, England). *Lancet* 2(7944):1069-1072; 1975.

The effects of two dose regimens of cimetidine on 24-hr intragastric acidity were investigated in six untreated patients with duodenal ulcer and in four patients who had undergone truncal vagotomy and pyloroplasty for duodenal ulcer. The subjects received placebo capsules on the first day and cimetidine on the second day. Cimetidine at 0.8 g/day decreased 24-hr mean H^+ activity by 55% in the untreated patients, but 1.6 g/day decreased it by 67%; the difference was due to a greater nocturnal decrease in the high-dose group. Intragastric pH remained below 2.0 for much of the treatment day, but similar values were found in four post-vagotomy patients. It is concluded that cimetidine results in a decrease of intragastric acidity that is compatible with successful medical treatment of duodenal ulceration.

3388 GASTRIC ACID RESPONSES TO GRADED I.V. INFUSION OF PENTAGASTRIN AND HISTALOG IN PEPTIC ULCER PATIENTS BEFORE AND AFTER ANTRUM-BULB RESECTION.

(Eng.) Bergegardh, S.; Broman, G.; Knutson, U.; Palmer, L.; Olbe, L. (Sahlgren's Hosp., Gothenburg, Sweden). *Scand. J. Gastroenterol.* 11(4): 337-346; 1976.

The effect of antrum-bulb resection on the parietal cell responsiveness to pentagastrin and Histalog was studied in 46 men with duodenal ulcer and in 9 men with gastric ulcer by analyzing dose-response curves before and after antrum-bulb resection. Graded i.v. infusions of pentagastrin and Histalog (0.52, 1.62, 9.0, 29.8, 90.8, and 298 μg/hr pentagastrin; 0.9, 3, 9, 52, and 162 mg/hr Histalog) were infused, increasing the dose every 60 min. Single-day multiple-dose tests were performed. The sensitivity to the humoral stimuli, as determined by the calculated ED_{50}'s, was not significantly different by duodenal ulcer patients with moderate (DU_{mod}) or massive (DU_{mass}) observed hypersecretion or for gastric ulcer (GU) patients before operation; the median ED_{50}'s of pentagastrin were 6.2, 6.6, and 13.1 μg/hr in 18 DU_{mod}, 22 DU_{mass}, and 7 GU patients, resp., and the median ED_{50}'s of Histalog were 16.6, 25.3, and 17.1 mg/hr in 14 DU_{mod}, 10 DU_{mass}, and 6 GU patients, resp. Antrum-bulb resection significantly reduced basal acid secretion and maximal acid responses to the humoral stimuli (about 45% reduction) but did not significantly change the loss of gastric contents to the intestine or the sensitivity to the humoral stimuli (median ED_{50} of pentagastrin increased from 5.2 to 6.7 μg/hr in 14 patients, and median ED_{50} of Histalog increased from 16.0 to 20.8 mg/hr in 12 patients). The results suggest that the intact antrum-bulb region of the ulcer patient controls the capacity to secrete acid. It is concluded that antrum-bulb gastrin is an important trophic factor for the parietal cells in man.

3389 THE EFFECT OF LONG-TERM POSTOPERATIVE PENTAGASTRIN INFUSION ON THE MAXIMAL ACID RESPONSES TO PENTAGASTRIN IN PATIENTS SUBJECTED TO ANTRECTOMY.

(Eng.) Bergegardh, S.; Olbe, L. (Sahlgren's Hosp., S-413 45 Gothenburg, Sweden). *Scand. J. Gastroenterol.* 11(4):347-351; 1976.

The effect of postoperative pentagastrin infusion on post-antrectomy decrease of the maximal acid response to pentagastrin in duodenal ulcer patients was investigated. Six duodenal ulcer patients subjected to antrectomy were given a continuous i.v. infusion of pentagastrin in a dose just below ED_{50} (5.0, 1.0, 3.0, 2.5, 5.0, and 1.0 μg/hr, resp.) during the first week after operation. The peak acid output following stimulation with pentagastrin (PAO_G) was determined pre-operatively and 1 and 5 weeks postoperatively. PAO_G was determined pre-operatively and 1 week after antrectomy in a control group of 25 duodenal ulcer patients, and pre-operatively and 5 weeks after antrectomy in another control group of 19 duodenal ulcer patients. One week post-antrectomy, the PAO_G was significantly less reduced (23%) in the pentagastrin infusion group than in the control group (46%). The reductions of PAO_G, 5 weeks post-antrectomy, were not significantly different in the pentagastrin infusion group and the control group. The results indicate that the dysfunction of the parietal cells, reflected in a decreased capacity to secrete acid following antrectomy, can be partially reversed by continuous administration of pentagastrin in the immediate post-operative course. It is suggested that in addition to its ability to stimulate acid secretion, antral gastrin in man also has a trophic effect on the parietal cells. This is analogous with the postulated trophic effect of antral gastrin in rats.

3390 TREATMENT OF DUODENAL ULCER WITH A LONG-ACTING SYNTHETIC SECRETIN: A PILOT TRIAL.

(Eng.) Demling, L.; Domschke, W.; Domschke, S.; Belohlavek, D.; Baenkler, H. W.; Fruhmorgen, P.; Lingenberg, G.; Wunsch, E.; Jaeger, E. (Depts. Medicine, Immunology, Univ. Erlangen-Nurnberg, Krankenhausstr. 12, D-852 Erlangen, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 22(5):310-313; 1975.

The effects of 4 weeks of treatment with long-acting synthetic secretin (10 clinical U/kg/day, s.c.) were assessed clinically, endoscopically, immunologically, and by means of gastric and pancreatic secretory analyses in three men with duodenal ulcer. Reduction of epigastric pain was noted within a few days following the onset of secretin therapy. In all cases, duodenoscopy revealed complete healing of ulcers after a 2- to 3-week treatment period. Before therapy, cutaneous anaphylactoid reactions due to intradermal injections of secretin were elicited in each subject; skin reactions were found mitigated after 4 weeks of therapeutic secretin administration, thus suggesting some desensitization. Neither gastric acid secretion nor pancreatic bicarbonate production were substantially influenced by the 4-week course of secretin therapy; consequently, prevention of ulcer relapse is unlikely to be achieved with the conditions employed in this study. However, the results are promising, in that the duodenal ulcers showed complete healing after only 2-3 weeks of secretin administration.

3391 ENDOSCOPIC EVALUATION OF THE EFFECT OF ULCERONE AND PLACEBO ON DUODENAL ULCERS.

(Eng.) Moshal, M. G. (Dept. Medicine, Natal Univ., Durban, South Africa). *S. Afr. Med. J.* 50(21):801-802; 1976.

The therapeutic effects of 50 courses of tripotassium di citrato bismuthate (Ulcerone) and placebo administered to ambulant patients with duodenal ulcers were investigated in a double blind trial for 6 weeks. Duodenoscopy was used for initial assessment and to judge improvement. The ulcers of 20 out of 30 patients (67%) healed completely with Ulcerone treatment, while another 7 patients showed partial improvement. The ulcers of 4 out of 20 patients (20%) on placebo showed healing. The difference is highly significant (x^2=20.0; p<0.001). The time for abatement of symptoms on Ulcerone was 4.9 ± 2.3 days and on placebo it was 13.6 ± 5.7 days, which was significant (p<0.01). There were no significant age differences, but the duration of illness in the male patients on placebo, who achieved complete symptomatic and endoscopically visible healing, was significantly less than that of patients treated with Ulcerone (p<0.005). No side effects were observed with Ulcerone treatment. It is concluded that Ulcerone therapy is safe and effective for ambulant patients with duodenal ulcers.

3392 RECURRENCE OF GASTRIC ULCER AFTER SELECTIVE VAGOTOMY AND PYLOROPLASTY FOR CHRONIC UNCOMPLICATED GASTRIC ULCER: A 5-10 YEAR FOLLOW UP.

(Eng.) De Miguel, J. (Pasco de Zorrilla 30, Vailadolid, Spain). *Br. J. Surg.* 62(11):875-878; 1975.

The recurrence of gastric ulcer after selective vagotomy and pyloroplasty for chronic uncomplicated gastric ulcer was investigated in a 5-10 yr follow-up study of 67 patients. Recurrence of gastric ulcer was found in 13 of 73 patients (19.1%). It occurred equally as often after treatment of primary and secondary gastric ulcers and it was twice as common in women as in men. In three patients, recurrence was diagnosed within the first year after operation. In 10 patients, recurrence took place between 2-7 yr after operation, with an average of 5 yr. In each case, the ulcers appeared in the same place as the original ulcer. It is concluded that vagotomy and pyloroplasty cure benign gastric ulcer in about 80% of patients and should be taken into account in the choice of surgical treatment, especially in cases when a gastrectomy might be a risk. Because of the high recurrence rate, it is doubtful whether this operation should be considered as the treatment of choice for all cases of gastric ulcer.

3393 GASTRIC OUTLET OBSTRUCTION AFTER OMENTOPEXY FOR PERFORATED ACUTE AND CHRONIC DUODENAL ULCERATION.

(Eng.) Read, R. C.; Thompson, B. W. (Veterans Admin. Hosp., 300 East Roosevelt Road, Little Rock, AK 72206). *Am. J. Surg.* 130(6):682-687; 1975.

The incidence of gastric outlet obstruction after omentopexy for perforated acute and chronic duodenal ulceration was investigated in 187 patients. Seventeen patients received an immediate definitive procedure; none died. Nine (5%) of the remaining 170 patients who had omentopexy died 1-15 days postoperatively. A total of 121 patients were adequately followed; 39 had acute perforation and 82 had chronic perforation. Twenty-four chronic patients underwent definitive operation within 3 months without mortality. Of the 99 patients followed after omentopexy, 25% required re-operation within 12 months. In contrast, only 3 of the 39 with acute perforation required operation as compared with 21 of the 58 with chronic perforation. In the chronic group, obstruction was the main cause of early operation; 21% of the patients failed to empty their stomach immediately or soon after omentopexy and half as many had pain or bled severely within 12 months; they also required re-operation. Overall, 57% of the 99 patients required a definitive operation 1-24 yr later; only 10 of the 39 patients in the acute group required definitive operation as compared with 45 of the 58 patients in the chronic group. Outlet obstruction of the stomach was the main indication for definitive surgery in 26 of the 55 reoperations. It is recommended that patients with chronic perforation should undergo immediate vagotomy and a drainage procedure rather than omentopexy.

3394 INTENSITY AND LOCALIZATION OF INFLAMMATORY ALTERATIONS OF THE GASTRIC MUCOSA IN GASTRIC AND DUODENAL ULCER AND IN GASTRIC CARCINOMA: INVESTIGATIONS OF PREPARATIONS OBTAINED AFTER GASTRIC RESECTION. (Ger.) Mobius, G.; Tungler, D. (Pathologisches Institut, DDR-27 Schwerin, Werderstrasse 30, E. Germany). *Dtsch. Z. Verdau Stoffwechselkr.* 35(3): 113-122; 1975.

3395 CLINICALLY CONTROLLED EXPERIMENTS CONCERNING THE CONSERVATIVE THERAPY OF GASTRIC AND DUODENAL ULCER. (Ger.) Gutz, H.-J. (Robert-Rossle-Klinik, Zentralinstitut fur Krebsforschung, 1115 Berlin-Buch, Lindenberger Weg 80, Germany). *Z. Aerztl. Fortbild. (Jena)* 70(4):173-176; 1976.

3396 GASTRODUODENAL ULCER: 1. PATHOPHYSIOLOGY OF GASTRODUODENAL ULCER. (Ger.) Halm, M.; Pahlig, H. (Medizinische Akademie "Carl Gustav Carus," 8019 Dresden, Fetscherstrasse 74, Germany). *Z. Aerztl. Fortbild. (Jena)* 70(2):92-95; 1976.

3397 EARLY POSTOPERATIVE EFFECTS OF TRUNCAL VAGOTOMY ON INTESTINAL MOTILITY. (Spa.) Diez Cascon, A.; Moreno Amezcua, J. M.; Bernales, L.; Hernandez Romero, J.; Diez-Cascon Menendez, E. (Departamentos de Cirugia y Radiologia, Residencia General de la S. S. "Francisco Franco," Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(5):585-604; 1976.

3398 METIAMIDE IN DUODENAL ULCER [Letter to Editor]. (Eng.) Wormsley, K. G. (Ninewells Hosp., Ninewells, Dundee DD2 1UB, Scotland). *Lancet* 2(7944):1085; 1975.

3399 THE 24-HOUR CONTROL OF INTRAGASTRIC pH BY CIMETIDINE, A NEW H_2-RECEPTOR ANTAGONIST, IN NORMAL SUBJECTS AND IN PATIENTS WITH DUODENAL ULCER [Abstract]. (Eng.) Pounder, R. E.; Williams, J. G.; Misiewicz, J. J.; Milton-Thompson, G. J. (Royal Naval Hosp., Plymouth, England). *Br. Soc. Gastroenterol.* 16(10):831; 1975.

3400 MASSIVE HEMORRHAGE FROM GASTRIC AND DUODENAL ULCER WITHOUT THE POSSIBILITY OF TRANSFUSION. (Ger.) Adler, E.; Wittmann, D. (Chirurgische Universitatsklinik, BRD-63 Giessen, Klinikstr. 37, W. Germany). *Zentralbl. Chir.* 100(10): 598-602; 1975.

3401 DYNAMICS OF ERYTHROCYTE, HEMOGLOBIN, PLATELET AND RETICULOCYTE COUNT CHANGES IN PATIENTS OPERATED UPON UNDER HEMODILUTION FOR GASTRIC AND DUODENAL ULCER. (Pol.) Lepert, R.; Orlowski, T.; Madry, K.; Brocki, M.; Papiernik, E. (II Klinika Chirurgiczna Instytutu Chirurgii WAM, 90-549 Lodz, ul. Zeromskiego 113, Poland). *Pol. Tyg. Lek.* 31(7):257-260; 1976.

3402 THEORETICAL AND CLINICAL ASPECTS OF ANTACID THERAPY. (Ger.) Ruppin, H. (Medizinische Universitatsklinik, 852 Erlangen, Krankenhausstrasse 12, W. Germany). *Med. Klin.* 70(30):1237-1242; 1975.

3403 EVALUATING FUNCTION OF THE STOMACH AND INTESTINE AS A FUNCTION OF THE SURGICAL TREATMENT OF PEPTIC ULCER. (Rus.) Romaniak, M. I.; Seniutovich, V. F.; Shevchuk, M. G.; Genyk, S. N. (Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Klin. Khir.* (5):48-50; 1976.

3404 ERRORS IN THE DIAGNOSIS OF PEPTIC ULCER OF THE STOMACH AND DUODENUM IN PATIENTS WITH OPISTHORCHOSIS. (Rus.) Kirilenko, M. P. (Tyumen Oblast Clinical Hosp., Tyumen, USSR). *Klin. Khir.* (5):62-64; 1976.

3405 RECENT TRENDS IN THE THERAPY OF PEPTIC ULCER. (Rus.) Radbil', O. S. (All-Union Scientific Res. Inst. Medical and Medical-Technical Information, USSR Ministry Health, Moscow, USSR). *Klin. Med.* 54(4):16-22; 1976.

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3408 STUDY OF CERTAIN METABOLIC PROCESSES AND THE PATHOGENETIC TREATMENT OF PATIENTS WITH POSTGASTRECTOMY SYNDROME. (Rus.) Iuldashev, K. Iu.; Irmukhamedov, A. G.; Khaidarov, T. S.; Zhitnitskaia, A. E.; Shaikhov, I. D. (Tashkent Inst. Postgraduate Training Physicians, Tashkent, USSR). *Ter. Arkh.* 48(3):89-96; 1976.

3409 SURGICAL COMPLICATIONS OF PEPTIC ULCER OF THE STOMACH AND OF THE DUODENUM IN ADOLESCENTS. (Rus.) Netakhata, Kh. N.; Zhukov, B. P.; Liapun, S. N. (A. M. Gorkii Donetsk Medical Inst., Donetsk, USSR). *Klin. Khir.* (4):50-53; 1976.

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3412 MODIFICATION OF GEORGE'S TEST FOR THE STUDY OF THE GASTRIC FUNCTION IN DUODENAL ULCER AND IN CHRONIC ATROPHIC GASTRITIS: PRELIMINARY RESULTS. (Spa.) Bixquert, M.; Gomez, C.; Garcia-Conde, J. (Facultad de Medicina, Universidad de Santiago de Compostela, Santiago de Compostela, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(6):695-716; 1976.

3413 INDICES OF NITROGEN TURNOVER IN PATIENTS WITH PEPTIC ULCER AND CHRONIC GASTROENTERITIS. (Rus.) Khodykin, A. V.; Kruk, V. I.; Zdesenko, P. P.; Goncharenko, T. V.; (Dnepropetrovsk Medical Inst., Dnepropetroysk, USSR). *Vrach. Delo* (3):81-82; 1976.

3414 DYNAMICS OF CERTAIN INDICES OF THE NITROGEN TURNOVER FOLLOWING GASTRIC RESECTION WITH SELECTIVE VAGOTOMY IN PEPTIC ULCER. (Rus.) Kozhushko, V. G. (Kharkov Medical Inst., Kharkov, USSR). *Klin. Khir.* (4):57-50; 1976.

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3419 TREATMENT OF YOUNG PATIENTS WITH PERFORATING ULCER OF THE DUODENUM. (Rus.) Surnin, A. V. (No affiliation given). *Klin. Khir.* (12):30-31; 1975.

3420 DUODENAL AND GASTRIC PEPTIC ULCERS IN LIVER DISEASES. (Pol.) Hasik, J.; Rajewska, J.; Rzymski, K.; Kiczka, M. (Instytut Chorob Wewnetrznych AM, Poznan, Poland). *Pol. Tyg. Lek.* 30(48):2001-2004; 1975.

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3422 CONTRIBUTION TO THE SURGICAL PATHOPHYSIOLOGY OF PEPTIC ULCER OF THE STOMACH: EXPERIMENTAL STUDY. (Spa.) Martin, A. L.; de Rueda, F. S. L.; Romero, M. Z. (Facultad de Medicina, Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 46(4):365-376; 1975.

3423 ASSOCIATION OF GASTRIC AND DUODENAL ULCER IN THE SAME PATIENT. (Spa.) Vizcaya, F. L.; Martin, A. L.; Romero, M. Z. (Facultad de Medicina, Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 46(5):541-546; 1975.

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3425 ROLE OF GENETIC FACTORS IN THE PATHOGENESIS OF PEPTIC ULCER AND CHRONIC GASTRITIS AND CHILDREN. (Ukr.) Prikhod'ko, O. I.; Ass, I. D.; Bilousov, Iu. V. (Ukrainian Inst. Postgraduate Training Physicians, Kiev, USSR). *Pediatr. Akush. Ginekol.* 37(4):6-7; 1975.

3426 PATHOGENESIS OF FUNCTIONAL DISTURBANCES AFTER GASTRIC RESECTION FOR PEPTIC ULCER. (Rus.) Poliakov, N. G. (Kiev Inst. Postgraduate Training Physicians, Kiev, USSR). *Klin. Khir.* (10):68-70; 1975.

3427 FUNCTIONAL STATUS OF THE BILE EXCRETORY SYSTEM AND THE EXOCRINE FUNCTION OF THE PANCREAS IN PEPTIC ULCER OF THE STOMACH AND DUODENUM. (Rus.) Belianin, V. I. (Red Army Kuban Medical Inst., Kuban, USSR). *Ter. Arkh.* 47:137-140; 1975.

3428 STATUS OF THE TONGUE AND BUCCAL MUCOSA IN PATIENTS WITH PEPTIC ULCER. (Rus.) Rudneva, V. E.; Kitova, N. F. (Moscow Medical Inst. Stomatology, Moscow, USSR). *Sov. Med.* (6):146; 1975.

See also, 3264, 3301, 3312, 3315, 3336, 3345, 3347, 3354, 3373, 3374, 3379, 3384, 3437, 3510, 3737, 3791.

3429 ADJUSTMENT OF ALKALINE pH IN AN ISOLATED JEJUNAL LOOP IN RELATION TO THE RATE OF PERFUSION.

(Fre.) Ardisson, J. L.; Dolisi, C.; Ozon, C. (Faculte de Medecine de Nice, avenue de Vallombrose, 06100 Nice, France). *C. R. Soc. Biol. (Paris)* 168(10/12):1382-1388; 1974.

The Thiry-Vella jejunal ansa (50 cm) of a dog was perfused with 6 ml/min and 3 ml/min solutions of NaCl-glucose at various pH levels (7.3-10.0) to determine the adjustment rate of alkaline pH values. Results indicate that the jejunal ansa adjusted quickly to a pH of about 7.6 and that solutions with a pH above 10.0 caused serious absorption disorders. The rate of perfusion influenced the adjustment; for 6 ml/min, the correlation between the pH at entry and the pH at exit persisted, implying that the adjustment is not completely finished upon exit. This correlation was not found with the 3 ml/min perfusion.

3430 ARTERIOMESENTERIC DUODENAL COMPRESSION SYNDROME: COMPARISON OF METHODS OF TREATMENT.

(Eng.) Appel, M. F.; Bentlif, P. S.; Dickson, J. H. (6624 Fannin St., Houston, TX 77025). *South. Med. J.* 69(3):340-342; 1976.

The clinical features and treatment methods for a group of 80 patients with arteriomesenteric duodenal compression syndrome is reviewed. Forty-eight patients were from a VA hospital. Vomiting was the most common symptom, present in 73% of patients in the accumulated series, followed by pain in 42%, and distension in 21% of the patients. Typical roentgenographic findings included duodenal, and sometimes gastric distension, which was sometimes accompanied by reverse peristalsis in the duodenum. Complete or nearly complete obstruction was seen in the transverse portion of the duodenum. These findings were present in 100% of the VA series and in 84% of the accumulated series. The incidence of ulcer disease and alcoholism with pancreatitis was much greater in the VA series, while in the accumulated series, the associations with asthenia and scoliosis were most common. The success and failure rates were fairly similar between medically (17) and surgically (15) managed patients in the VA series. In the accumulated series, the surgical results were superior to the nonsurgical results. Of the 27 patients initially treated medically, 9 recovered and 18 had early failure. Of the 102 treated surgically, only 3 required a second procedure for ultimate cure. The two most commonly performed operations were section of the ligament of Treitz and duodenojejunostomy. The greatest success for both groups occurred after duodenojejunostomy. It is concluded that duodenojejunostomy is a safe and effective operation for the majority of patients who require surgery for arteriomesenteric duodenal compression syndrome.

3431 PRIMARY INTESTINAL LYMPHOMA AND ITS RELATION TO ALPHA HEAVY CHAIN DISEASE.

(Eng.) Ramot, B.; Hulu, N. (Chaim Sheba Medical Center, Tel-Hashomer, Israel). *Br. J. Cancer* 31(Suppl. 2):343-349; 1975.

Clinical manifestations and the course of intestinal lymphoma, as well as its relation to α-heavy chain disease, are described. Two cases occurring in Arab men are presented. Both presented with severe malabsorption and αI type heavy chain disease in the serum. In one case, x-ray of the intestine showed an abnormal mucosal pattern with signs of pressure suggesting intestinal lymphoma. In the other case, only a malabsorption pattern was seen. In both cases, a diagnosis of intestinal lymphoma was reached. The first patient received tetracycline (1 g/day) and later intermittent Alkeran (melphalan) later and the immunoglobulin G level diminished. The second patient responded to tetracycline therapy to the point of possible recovery, casting doubt on the original diagnosis of a malignant condition. The α-heavy chain diminished from 2,600 mg/100 ml to 550 mg/100 ml in this second patient. Thus, α-heavy chain disease may be regarded as an immune response of the gut to a noxious agent, followed by a clonal evolution of a functionally abnormal plasma cell. However, when severe monotonous uniform cell infiltration with destruction of the glands is present, a malignant process is suggested. Observations have indicated that the Arab population is exposed to repeated infections. However, studies of immunoglobulin levels to determine predisposing factors were discouraging.

3432 CONGENITAL CHLORIDORRHOEA: A QUESTION OF REVERSED BRUSH BORDER TRANSPORT PROCESSES AND VARYING JUNCTIONAL TIGHTNESS.

(Eng.) Rask-Madsen, J.; Kamper, J.; Oddsson, E.; Krag, E. (Herlev Hosp., DK-2730 Copenhagen/Herlev, Denmark). *Scand. J. Gastroenterol.* 11(4):377-383; 1976.

The effect of glycochenodeoxycholic acid (GCDC) on transepithelial ionic fluxes and the transmural potential difference (PD) in the perfused small and large intestine were studied in an 8-month-old boy with congenital chloridorrhea. Na, K, and Cl, as well as water, were secreted in the ileum, and HCO_3 was absorbed. The lumen was 91 mV negative to blood. Only Cl was transported against both electrical and chemical gradients, but discrepancies between observed and predicted Na flux ratios suggested the presence of a Na-absorbing mechanism as well. Mucosa was impermeable to Cl from the lumen side. GCDC, 2.5 mM, mediated Na and water absorption and abolished any transport of Cl. The PD was -95 mV. In the colon, a similar pattern was observed, and mucosa to serosa fluxes of Cl were abnormally low. Rectal PD was -116 mV. GCDC made the epithelium more absorptive in function, but contrary to ileum, the effect was due to an increase of Na and Cl fluxes from mucosa to serosa. The patient was at that time in severe electrolyte imbalance. He was reinvestigated 3 months later and was found to be in good clinical condition with normal serum electrolytes. Net transfer of electrolytes and water and bidirectional fluxes of Cl and K were unchanged while bidirectional Na fluxes increased considerably and PD decreased to -18 mV. Rectal PD was -45 mV. In the jejunum, water and electrolyte transport were normal, and PD was -3 mV. It is tentatively concluded that the abnormal transport in ileum is due to an inversion of the brush border transport processes, which also satisfies the paradoxical effects of GCDC. Na and Cl seem to migrate through separate pathways. A varying degree of junctional tightness, which is almost completely cationic, may be responsible for the functional differences observed in response to improvement of the general electrolyte status.

3433 DECREASED TRYPSIN AND BILE ACIDS IN ILEAL FISTULA DRAINAGE DURING THE ADMINISTRATION OF A CHEMICALLY DEFINED LIQUID ELEMENTAL DIET.

(Eng.) Hill, G. L.; Mair, W. S. J.; Edwards, J. P.; Goligher, J. C. (Univ. Dept. Surgery, General Infirmary, Leeds, England). *Br. J. Surg.* 63(2):133-136; 1976.

Ten patients with a well established ileostomy were studied, and alterations in ileostomy content of trypsin and bile acids were measured during the ingestion of an elemental diet. After a 4-day control study, the patients were given an elemental diet as the sole nutritional source for a 10-day period. For the last 3 days of the study, an additional 2 l of water were consumed with the elemental diet. The mean daily fecal output for the group during the control period was 578 ± 300 ml, and during administration of the elemental diet the fistula output fell to 418 ± 190 ml ($p<0.02$); there was also a decrease in the concentration of sodium in the ileal fluid (104.7 ± 22 mEq/l to 80.2 ± 25 mEq/l, $p<0.01$). For the group as a whole, there was a decrease in the concentration of trypsin (0.671 IU/ml to 0.554 IU/ml, $p<0.025$) and bile acids (0.911 mmol/ml to 0.662 mmol/ml, $p<0.005$) in the ileal excreta. Although the concentration of amylase in the ileal fluid rose, the total output was not altered. Oral administration of an additional 2 l of water did not alter the concentration of trypsin or bile acids in the ileal fluid. It is concluded that elemental diet ingestion produces changes in ileal fistula output that are beneficial to the patient with an enterocutaneous fistula. Output from the fistula of fluid and electrolyte, and the corrosive nature of the discharge are both reduced.

3434 EXPERIENCE WITH 26 RESERVOIR ILEOSTOMIES.

(Eng.) Goligher, J. C.; Lintott, D. (General Infirmary, Leeds, England). *Br. J. Surg.* 62(11):893-900; 1975.

Experience gained in establishing reservoir ileostomies in 26 patients is presented. In 13 cases, the operation represented a conversion from a previous conventional ileostomy, and in the other 13 cases, the reservoir ileostomy was part of the primary colectomy or proctocolectomy. In two or three cases, the original pathological state was Crohn's disease; in the rest, it was ulcerative colitis. In eight patients, recovery was seriously impeded by complications related to the reservoir technique. Of the 23 patients who left the hospital with a reservoir ileostomy, 8 had a reservoir without nipple valves and 15 had reservoirs with nipple valves. Nine of the patients with nipple valves were fully continent and had no need for an external ileostomy appliance; these nine operations were considered completely successful. The best chance for obtaining a truly continent reservoir requires the creation of an efficient valve in the exit conduit. In patients who suffered extrusion of the valve, it was sometimes possible to effect a reconstruction of the valve at a subsequent operation; this yielded good results or at least some improvement. In cases where refashioning was not attempted, and intubation was difficult or impossible, the stoma could be managed like a conventional ileostomy, allowing ileal contents to drain incontinently into an ileostomy bag. In patients with an intact functioning valve and periodic obstruction to the passage of the tube, together with complete retention in the reservoir, a further surgical approach to the valve to alter its axis was occasionally beneficial. There was no operative mortality in this series.

3435 ARTHRITIS ASSOCIATED WITH INTESTINAL-BYPASS PROCEDURE FOR MORBID OBESITY: COMPLEMENT ACTIVATION AND CHARACTERIZATION OF CIRCULATING CRYOPROTEINS.

(Eng.) Wands, J. R.; LaMont, J. T.; Mann, E.; Isselbacher, K. J. (Massachusetts General Hosp., Boston, MA 02114). *N. Engl. J. Med.* 294(3):121-124; 1976.

Five patients were studied after intestinal bypass operations for morbid obesity to determine if the arthritis observed in three of these patients was associated with circulating cryoproteins. The case reports of the arthritic patients are presented. Only serum from the three patients with acute arthritis contained cryoprotein complexes. The complexes comprised immunoglobulin (Ig) G, IgM, IgA, complement components C_3, C_4, C_5, and IgG antibody against *Escherichia coli* and *Bacillus fragilis*. The C_3-activator fragment of the properdin complex was identified in fresh serum samples obtained from two of the three patients with circulating cryoprotein complexes and arthritis. These observations suggest that systemically absorbed intestinal bacterial antigens may lead to (or contribute to) the formation of circulating cryoprotein complexes. Circulating cryoprotein complexes activate both the classical and alternate complement pathways and may be important in the pathogenesis of the arthritis associated with the intestinal bypass procedure for morbid obesity.

3436 IMMUNOLOGICAL FUNCTION IN PATIENTS OPERATED ON WITH SMALL INTESTINAL SHUNTS FOR MORBID OBESITY.

(Eng.) Hallberg, D.; Nilsson, B. S.; Backman, L. (Karolinska Hosp., S-104 01, Stockholm 60, Sweden). *Scand. J. Gastroenterol.* 11(1):41-48; 1976.

Immunological functions were studied in obese patients before and at 4, 8, and 12 months after ileojejunal bypass operation. Four patients underwent a jejuno-ileostomy end-to-side operation; others underwent a jejuno-ileostomy end-to-end with an ileo-coecostomy of the blind loop. No serious postoperative complications occurred. Weight loss was about 40 kg/patient 12 months after operation. In all but one case, there was an increased reactivity to PPD tuberculin after operation, rising from a preoperative level of 13.2 to 33.2 mm diameter at 12 months after operation. Immediate reactions to *Candida albi-*

cans were noted in 2/11 patients before operation and in 8/8 patients at 12 months after operation. No essential changes were noted in WBC and differential counts during the study period, nor were there changes in immunoglobulin concentrations. For the group as a whole, there was no significant change in sheep erythrocyte-binding lymphocytes. A statistically insignificant increase occurred in the lymphocyte reactivity to phytohemagglutinin. Lymphocyte reactivity to PPD and tetanus toxoid increased only slightly. Thus, within a year after operation, an increased immunological reactivity against two unrelated antigens, as measured by skin tests, was noted. This reactivity seems to be of both B cell type (immediate reactions to *Candida*) and T cell type, as evidenced by delayed reactions. At present, there is no explanation of the findings.

3437 POST-PRANDIAL CHANGES IN pH AND ELECTROLYTE CONCENTRATION, IN THE UPPER JEJUNUM AFTER TRUNCAL VAGOTOMY AND DRAINAGE IN MAN. (Eng.) Temple, J. G.; Birch, A.; Shields, R. (Manchester Univ., Dept. Surgery, Salford, Lancs, England). *Gut* 16(12):961-965; 1975.

Changes in pH and electrolyte concentrations in the lumen of the upper small bowel were studied in 21 patients after truncal vagotomy and drainage and in a control group of subjects who had no gastric operation. Generally, the jejunal pH of post-vagotomy patients was related to the results of the insulin test. In insulin-negative patients, the jejunal content was more alkaline throughout the test than in either insulin-positive or control subjects. There was no relation between jejunal pH and post-vagotomy diarrhea. The jejunal sodium concentration pattern in post-vagotomy subjects was different from that in controls. There was a rapidly increasing sodium concentration throughout the first 60 min of the test. At 120 and 150 min, sodium concentration in the incomplete vagotomy group was similar to controls. However, patients with a complete vagotomy maintained a higher sodium concentration than either the incomplete vagotomy or the control subjects throughout the test. No relation was found between post-vagotomy diarrhea and jejunal sodium concentration. All post-vagotomy patients showed a steady fall in potassium concentration, but the value at 60 min in both insulin-negative and insulin-positive patients was significantly lower than that in controls regardless of the presence or absence of diarrhea. During the first 30 min of the test, both the complete and incomplete vagotomy patients showed chloride concentrations significantly lower than controls. After 60 min, the incomplete vagotomy patients had potassium levels that were similar to controls while those with complete vagotomies continued to demonstrate lowered potassium lelvels. Chloride concentrations of post-vagotomy subjects showed no variations between those who were insulin-negative or insulin-postive. It is concluded that after truncal vagotomy and drainage, the pH and concentrations of sodium and potassium in the upper small bowel are related chiefly to the completeness of vagal section. Post-vagotomy diarrhea has no particular association with these findings.

3438 ACCIDENTAL TRANSSECTION OF THE AMPULLA OF VATER AT DUODENAL SURGERY. (Ger.) Middendorp, U. G.; Krampf, K. (Chirurgische Klinik, Kantonsspital, CH-8401 Winterthur, Switzerland). *Helv. Chir. Acta* 42(5/6):871-873; 1975.

3439 CLOSED INJURIES OF RETROPERITONEAL PORTION OF DUODENUM. (Rus.) Sorokin, S. S.; Klycheva, L. I. (Tula Municipal Hosp. No. 5, Tula, USSR). *Khirurgiia (Mosk.)* 4(4):100-106; 1975.

3440 RADIOLOGICAL ASPECTS OF DUODENAL MYOMAS. (Ita.) Bacarini, L.; Dal Molin, F. (Istituto di Radiologia, Universita di Trieste, Italy). *Quad. Radiol.* 39(1/2/3):21-36; 1974.

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3442 ACQUIRED HYPEROXALURIA AND NEPHROLITHIASIS IN GASTROINTESTINAL DISEASE ("ENTERIC" HYPEROXALURIA). (Ger.) Caspary, W. F. (Medizinische Universitatsklinik, Gottingen, Germany). *Dtsch. Med. Wochenschr.* 100(28):1509-1513; 1975.

3443 PROTOCOL OF A STUDY ON MEDITERRANEAN LYMPHOMA AT THE HOSPITAL CENTER, AMERICAN HOSPITAL, BEIRUT. (Fre.) Salem, P. A.; Nassar, V.; Hajj, A.; Balikian, G.; Alami, S.; Shamaa, M.; Salem, A. (No affiliation given). *J. Med. Liban* 28(2):215-224; 1975.

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3445 DUODENAL RETICULUM CELL SARCOMA. (Spa.) Estrada-Gonzalez, L.; Gonzalez-Cachon, B.; H.-Zapatero, A. (Ciudad Sanitaria "Nuestra Senora Covadonga," Oviedo, Spain). *Rev. Esp. Enferm. Apar. Dig.* 46(3):319-328; 1975.

3446 EXTERNAL FISTULAS OF THE SMALL INTESTINE. (Fre.) Maillet, P.; Edelmann, G.; Tremolieres, J. (7, rue de Bonnel, 69-Lyon [III^{e}], France). *J. Chir. (Paris)* 110(1/2):89-104; 1975.

3447 DANGER OF ASPIRIN DURING PELVIC IRRADIATION [Abstract]. (Eng.) Pounder, R. E. (Central Middlesex Hosp., Park Royal, London, NW10 7NS, England). *Lancet* 2(7943):1044-1045; 1975.

3448 TUMORS OF THE SMALL INTESTINE: ANATOMICAL AND CLINICAL REVIEW OF 104 CASES. (Fre.) Garin, Ch.; Lanitis, G.; Rousta, B.; Saegesser, F.

(Service universitaire de chirurgie, CH-1011 Lausanne, Switzerland). *Helv. Chir. Acta* 42(4):579-582; 1975.

3449 INTESTINAL CYSTIC PNEUMATOSIS WITH SPONTANEOUS PNEUMOPERITONEUM: POSSIBLE ROLE OF LAPAROTOMY IN ITS INVOLUTION [Letter to Editor]. (Fre.) Lekacos, N. L.; Androulakakis, Ph. A.; Apostolides, N. S. (Hosp. Hippocration, Athenes 609, Greece). *Nouv. Presse Med.* 4(39):2811; 1975.

3450 DISTAL DUODENOSTOMY AND FISTULAS OF THE UPPER DIGESTIVE TRACT AFTER SURGERY. (Spa.) Diez Cascon, A.; Gemar Antunez, E.; Prim Mercader, P.; Rafael Pena, P.; Diez-Cascon Menendez, E.; Gispert, C. (Residencia General "Francisco Franco," Seguridad Social, Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(1):23-46; 1976.

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3457 RECURRENT ILEOCECOCOLONIC INVAGINATIONS AND EDEMATOUS INFLAMMATION OF THE ILEOCECAL VALVE. (Fre.) Paris, J.; Quandalle, P.; Paris, J.-C.; Houcke, M.; Gireau, J. (Clinique des Maladies de l'Appareil Digestif et de la Nutrition, C.H.U., place de Verdun, F 59000 Lille, France). *Sem. Hop. Paris* 50(41):2533-2535; 1974.

3458 ILEOCECAL SARCOID GRANULOMATOSIS LEADING TO SUBILEUS. (Hun.) Dlustus, B. (Fovarosi VIII. ker. Balassa Janos Korhaz, Budapest, Hungary). *Orv. Hetil.* 116(39):2313-2315; 1975.

3459 ENTEROKINASE DEFICIENCY: ONE OBSERVATION. (Fre.) Pardou, A.; Cadranel, S.; Rodesch, P.; Eggermont, E.; Loeb, H. (Hopital Universitaire Saint-Pierre, 320, rue Haute, Bruxelles, Belgium). *Pediatrie* 30(5):544; 1975.

3460 THE STATE OF THE MUCOSA OF THE SMALL INTESTINE IN HIGH INTESTINAL FISTULAS. (Rus.) Bognitskaia, T. N.; Rudenskaia, M. V.; Pletneva, L. P. (N. V. Sklifosovskii Moscow Scientific Res. Inst. of First Aid, Moscow, USSR). *Arkh. Patol.* 37(10):42-49; 1975.

3461 CLINICAL IMPORTANCE OF DIFFERENT FORMS OF DYSKINESIA OF THE SPHINCTER OF ODDI, AS SHOWN BY INTRA-OPERATIVE CHOLANGIOGRAPHY. (Rus.) Trunin, M. A.; Postrelov, N. A. (Leningrad Inst. Hygiene and Medicine, Leningrad, USSR). *Khirurgiia* (1):87-89; 1976.

3462 INTESTINAL DISACCHARIDASE AND ALKALINE PHOSPHATASE ACTIVITIES OF JEJUNAL BIOPSIES IN SMALL BOWEL DISEASES IN CHILDREN. (Ger.) Lucking, Th. (Medizinischen Hochschule, Karl Wiechert-Allee 9, D-3000 Hannover 61, W. Germany). *Eur. J. Pediatr.* 121(4):263-277; 1976.

3463 STUDY OF ENTERAL RESORPTION IN HUMANS. (Ger.) Laue, R.; Dietze, F. (Bereich Medizin, Karl-Marx-Universitat, DDR-701 Leipzig, Liebigstrasse 27, E. Germany). *Wiss. Z. Karl-Marx-Univ. Leipzig Math. Naturwiss. Reihe* 24(1):33-39; 1975.

3464 LIVER DAMAGE AFTER INTESTINAL SHUNT OPERATION FOR WEIGHT REDUCTION. (Ger.) Schmeisser, W.; Schrader, C. P.; Greim, H.; v. Oldershausen, H.-F. (Medizinische Universitatsklinik Tubingen, D-7400 Tubingen, W. Germany). *Z. Gastroenterol.* 13(7):619-628; 1975.

3465 AN EXTREMELY RARE CASE OF SITUS INVERSUS OF THE SMALL AND LARGE INTESTINE WITH COMPLETE PRESERVATION OF COLONIC MESENTERY. (Pol.) Dolinski, J.; Niezanowski, C.; Noczynski, L. (Instytut Chirurgii AM, ul. Poniatiwskiego 2, 50-326 Wroclaw, Poland). *Wiad. Lek.* 29(5):417-421; 1976.

3466 EXPERIENCE WITH CONTINENT ILEOSTOMY AT KANTONSSPITAL ZURICH. (Ger.) Hahnloser, P.; Geroulanos, S.; Sauberli, H.; Schauwecker, H. H.; Kock, N. G. (Chirurgische Universitatsklinik A, Kantonsspital, CH-8091 Zurich, Switzerland). *Helv. Chir. Acta* 42(1/2):213-217; 1975.

See also, 3100, 3219, 3228, 3238, 3264, 3265, 3267, 3290, 3302, 3303, 3306, 3311, 3353, 3369, 3382, 3383, 3397, 3403, 3407, 3419, 3468, 3498, 3525, 3536, 3723, 3725, 3727, 3737, 3741, 3744, 3745, 3757, 3765, 3775, 3777, 3801, 3806.

SMALL INTESTINE

Malabsorption

3467 SPECIFICITY OF ULTRASTRUCTURAL CHANGES OF SMALL INTESTINAL EPITHELIUM IN EARLY CHILDHOOD. (Eng.) Araya, M.; Walker-Smith, J. A. (Royal Alexandra Hosp. Children, Camperdown, N.S.W., 2050, Australia). *Arch. Dis. Child.* 50(11):844-855; 1975.

Ultrastructure of the small intestinal mucosa was studied in 30 consecutive small intestinal biopsies taken from 30 children with probable celiac disease (14) or nonspecific mucosal damage (16) due to chronic intermittent diarrhea from various causes. Findings were compared to normal small intestinal mucosa. The most common findings in celiac biopsies included an abnormal brush border, increased number of free ribosomes, rich rough endoplasmic reticulum, poorly developed smooth endoplasmic reticulum, large Golgi complexes, and thickened basal lamina. These changes are suggestive of abnormal cellular metabolism. However, they were also observed in children with a variety of clinical conditions and could not be specifically related to celiac disease. In small children, different causes leading to different degrees of abnormal small intestinal mucosa produce nonspecific changes of the cellular ultrastructure, which cannot be related to the degree of abnormality observed at the light microscopic level.

3468 HYPERSENSITIVITY TO COW'S MILK: NEW STUDY OF 33 CASES. (Fre.) Despres, P.; Gendrel, D.; Plainfosse, B.; Chirazi, S.; Seringe, P. (Hopital des Enfants Malades, 75730 Paris Cedex 15, France). *Ann. Pediatr.* 21(5):375-384; 1975.

Case reports of 33 nursing infants who developed intolerance to cow's milk are presented. Similar hypersensitivity occurred in close family members in 14 cases, and 7 cases had a family history of allergy (asthma, eczema, urticaria, etc.). Symptoms appeared when infants were less than 3 weeks old in 24 cases and before 3 months in the other cases. Diarrhea occurred in all 33 infants and concomitant dehydration was the reason for hospitalization in 26 of the cases. Additional symptoms included vomiting, severe shock, anorexia, and excessive thirst. Eczematous erythema was observed in 12 cases, usually on the face, and 22 infants were anemic. Examination of stools usually revealed a pH greater than 7, which distinguished the diarrhea from that of sugar intolerance. Sugar or blood was frequently present in the stools, and gram positive bacteria were predominant. Mild steatorrhea was often observed after prolonged periods. Indications of malabsorption included hyperglycemia, after oral glucose or xylose, and hypoproteinemia. Barium x-rays of the small intestine revealed hypersecretion, jejunal dilation, and thickening of the mucosa. Utilizing lactoglobulin and lactoalbumin as antigens, the lymphoblast transformation test proved positive in 17 of the 33 cases. Infants were treated with i.v. diets or with carrot soup until their digestive systems became normal. Synthetic, reconstituted milk or milk from humans or horses was substituted for cow's milk. Hypersensitivity to cow's milk disappeared spontaneously, most often between the ages of 10 months and 2.5 yr.

3469 DEFICIENCY OF SECRETORY Ig-A AND INTESTINAL MALABSORPTION. (Eng.) Krakauer, R.; Zinneman, H. H.; Hong, R. (Minneapolis Veterans Admin. Hosp., Minneapolis, MN). *Am. J. Gastroenterol.* 64(4):319-323; 1975.

Deficiency in secretory immunoglobulin (Ig) A and near abscence of secretory component (S.C.) in the jejunal contents of a 52-yr-old uremic man with diarrhea and malabsorption syndrome were investigated. Secretory IgA was present only in trace amounts in the jejunal contents and parotid secretions, whereas normal subjects showed secretory IgA in concentrations of 70-340 mg/100 ml. Serum concentrations of IgA were normal. Only traces of S.C. were found in the jejunal aspirate. The jejunal aspirate yielded bacterial growth of 10^8 colonies of *Streptococci*/mm^3, which were sensitive to cephalothin, tetracycline, chloramphenicol, and lincomycin. When the patient was given human colostrum (20-30 ml/day), his diarrhea disappeared within a week. By 6 weeks, the malabsorption parameters had improved; serum carotene concentration rose from 51 to 73 µg/100 ml and the 2-hr calcium absorption rose to 1.18%/1. At this point, the patient refused further colostrum, and weakness and diarrhea reappeared. The case poses questions concerning the etiology of a malabsorption syndrome appearing during chronic renal insufficiency. The reversal of diarrhea and malabsorption following p.o. administration of human colostrum may have been due to the relatively modest amount of secretory IgA present in the colostrum. Lactoferrin may also have been involved, as enterococci may have been affected by the iron-binding activity of lactoferrin.

3470 THE ABSORPTION OF ANTIBIOTICS IN ADULT PATIENTS WITH COELIAC DISEASE. (Eng.)

Parsons, R. L.; Hossack, G.; Paddock, G. (Guy's Hosp. Medical Sch., St. Thomas' St., London SE1 9RT, England). *J. ANtimicrobiol. Chemother.* 1(1):39-50; 1975.

Patterns of antibiotic absorption were studied in groups of normal subjects and adults with celiac disease. Drugs studied included amoxycillin, ampicillin, cephalexin, clindamycin, erythromycin ethyl succinate, erythromycin stearate, sodium fusidate, lincomycin, pivampicillin, rifampicin, sulfamethoxoazole, and trimethoprim. Four different patterns of antibiotic absorption were noted in celiac patients. A significant increase in the mean plasma levels 2 hr after dosing in celiacs compared with normal subjects was noted for trimethoprim (1.58 versus 1.18 μg/ml), sulfamethoxazole (48.35 versus 39.67 μg/ml), fucidin (24.12 versus 14.45 μg/ml), cephalexin (10.31 versus 6.90 μg/ml), and clindamycin (2.57 versus 2.10 μg/ml). The absorption of amoxycillin and pivampicillin was definitely impaired. Peak absorption of rifampicin was delayed from 4.99 μg/ml at 1 hr for normal controls to 4.82 2 hr for celiac patients. Ampicillin, erythromycin ethyl succinate and stearate, and lincomycin absorption was not significantly different in celiacs as compared with normal subjects. Conventional factors said to control drug absorption, such as lipid solubility, molecular weight, or pK_a did not account for these findings. The etiology of changes in antibiotic absorption in celiac disease is probably multifactorial, including alterations in the rate of gastric emptying, changes in intestinal motility, alterations in the concentration gradient across the intestinal lipid membrane, and increased permeability across the damaged mucosa. Impaired absorption of drugs requiring hydrolysis to their active constituents is probably related to deficiencies of enzymes such as esterase, which occur in celiac disease.

3471 CELL-MEDIATED IMMUNITY TO GLUTEN FRACTION III IN ADULT COELIAC DISEASE. (Eng.)

Holmes, G. K. T.; Asquith, P.; Cooke, W. T. (Dept. Experimental Pathology, Univ. Birmingham, England). *Clin. Exp. Immunol.* 24(2):259-265; 1976.

The *in vitro* response to 2 and 4 mg of gluten fraction III of peripheral blood lymphocytes from 27 healthy control subjects, 21 celiac patients on a gluten free diet, and 14 patients on a normal diet was investigated. The cell-mediated response to gluten was determined by measuring the degree of stimulation of lymphocytes cultured in the presence of antigen and tritiated thymidine (0.5 μCi, 150 mCi/mM). There were significant increases in the mean ratios of response for lymphocytes from gluten free celiacs as compared with healthy controls, after 4, 5, and 6 days of culture. There was no significant difference between the mean response of celiacs on a normal diet and controls at 2 mg, although with 4 mg gluten the difference was significant ($p<0.05$) on days four and five of culture. For each day of harvest, a greater percentage of gluten free celiacs had increased ratios compared with those on a normal diet, for both 2 and 4 mg gluten. The percentage of patients on a gluten free diet with at least one abnormal result on day 4, 5, or 6, irrespective of the amount of gluten fraction III used in the cultures, was 52% (11/21) compared with 29% (4/14) for normal diet subjects. When three additional patients were changed from a normal to a gluten free diet, the ratios of response for their lymphocytes increased. The results suggest that certain celiacs may exhibit a delayed hypersensitivity reaction to gluten.

3472 ELECTROGENIC GLUCOSE ABSORPTION IN UNTREATED AND TREATED COELIAC DISEASE. (Eng.)

Read, N. W.; Levin, R. J.; Holdsworth, C. D. (Royal Infirmary, Sheffield, England). *Gut* 17(2):444-449; 1976.

Changes in electrogenic glucose absorption was investigated in patients with active and treated celiac disease and in healthy volunteers. The operational kinetic parameters of "Apparent KM" and potential difference (PD) max were estimated using a method for measuring changes in transmural PD across the human jejunum *in vivo*. The transfer PD generated by 10 mM glucose was much higher in patients with untreated celiac disease ($p<0.0001$). At 20 mM ($p<0.005$) and at 50 mM ($p<0.05$), the differences in PD became less significant and at 100 mM, the transfer PD's were virtually identical. Both the Apparent KM (17 ± 2 mM) and the PD max (8.6 ± 0.7 mV) in nine patients with untreated celiac disease were significantly lower ($p<0.005$) than in the control group (Apparent KM, 74 ± 5 mM; PD max, 12.8 ± 0.9 mV). Treatment of five celiac patients with gluten withdrawal for less than 3 months increased significantly the values of both the Apparent Km (35 ± 6 mM) and the PD max (11.4 ± 1.2 mV). Treatment of five patients for more than 6 months caused a further increase in the values of both kinetic parameters (Apparent KM, 108 ± 13 mM, $p<0.005$; PD max, 15.6 ± 2.7 mV, $p>0.05$) to levels which exceeded those in healthy subjects. The results indicate that the operational kinetic parameters of electrogenic glucose absorption are greatly affected by celiac disease.

3473 JEJUNAL PERFUSION OF SIMPLE AND CONJUGATED FOLATES IN TROPICAL SPRUE. (Eng.)

Corcino, J. J.; Reisenauer, A. M.; Halsted, C. H. (Univ. Puerto Rico Sch. Medicine, San Juan, PR 00936). *J. Clin. Invest.* 58(2):298-305; 1976.

Absorption of labeled simple 3',5',9'-^{3}H pteroylmonoglutamate ([^{3}H]PG-1) and conjugated pteroyl-μ[^{14}C]glutamyl-γ-hexaglutamate ([^{14}C]PG-7) folates was assessed in six patients with tropical sprue, before and after 6 months of treatment, utilizing jejunal perfusion and urinary recovery techniques. Degradation products of [^{14}C]PG-7 produced during perfusion were identified by DEAE-cellulose column chromatography. Jejunal mucosal activities of folate conjugase, lactase, sucrase, and maltase were measured in every patient. Malabsorption of both [^{3}H]-PG-1 and [^{14}C]PG-7 was found in all patients prior to treatment; significant improvement was observed after therapy. The urinary excretion of ^3H and ^{14}C paralleled the luminal disappearance of both isotopes. The chromatographic patterns of intraluminal degradation products of [^{14}C]PG-7 obtained during perfusion did not differ from those previously found in normal subjects and were similar in studies performed before and after treatment. The activity of folate conjugase was increased in the mucosa of the untreated patients when compared to the post-treatment levels, while the activities of mucosal lactase, sucrase, and maltase were originally low and increased significantly ($p<0.01$, $p<0.01$, $p<0.005$ for lactase, sucrase, and maltase, resp.) after therapy. It is suggested that folate conjugase originates at a different mucosal locus than the brush border disaccharidases and that folate conjugase is an intracellular enzyme. The results demonstrate unequivocal malabsorption of both simple and conjugated folates in tropical sprue. In tropical sprue, folate malabsorption is the reflection of impaired folate transport and not of impaired hydrolysis.

3474 CHRONIC IDIOPATHIC HYPERPHOSPHATASIA: A CASE WITH MALABSORPTION SYNDROME. (Ita.) Duillo, M. T.; Pelizza, A.; Caramia, G. (Istituto di Puericultura "L. Gaslini" dell'Universita di Genova, Genova, Italy). *Minerva Pediatr.* 27(27): 1465-1477; 1975.

3475 NEW DATA ON THE PHYSICOCHEMICAL AND IMMUNOLOGICAL PROPERTIES OF GLIADIN AND ON ITS ROLE IN THE PATHOGENESIS OF CELIAC DISEASE. (Hun.) Csorba, S. (Debreceni Orvostudomanyi Egyetem Gyermekklinikaja, Debrecen, Hungary). *Gyermegkgyogyaszat* 26(1):26-32; 1975.

3476 ACQUIRED TRANSITORY ACANTHOCYTOSIS AND ABETALIPOPROTEINEMIA IN SERIOUS MALABSORPTION SYNDROME. (Ger.) Sartorius, J.; Leib, U.; Buhler, U.; Vest, M. (Univ.-Kinderklinik Basel, Romergasse 8, CH-4005 Basel, Switzerland). *Monatsschr. Kinderheilkd.* 124(5):375-376; 1976.

3477 COMPARATIVE STUDY OF THE DEVELOPMENT OF THE SMALL INTESTINAL MUCOSA, d-XYLOSE TEST, SERUM IMMUNOGLOBULINS AND IgA QUOTIENT IN THE COURSE OF REMISSION AFTER CELIAC DISEASE. (Ger.) Tinschmann, P. (Kinderklinik, St.-Josef-Hospital, Wilhelmstrasse 34, D-4200 Oberhausen 11, W. Germany). *Monatsschr. Kinderheilkd.* 124(5):371-373; 1976.

3478 CELIAC DISEASE AND HERPETIFORM DERMATITIS. (Fre.) Schnitzler, L.; Delaitre, R.; Schubert, B.; Salquain, C.; Leroux, P.; Mougenot, J.-F. (C.H.U., Angers, France). *Pediatrie* 30(5):493-502; 1975.

See also, 3351, 3429, 3431, 3735, 3736, 3777, 3806.

LARGE INTESTINE

3479 AN OPTICAL AND ULTRASTRUCTURAL STUDY OF THE LOCALIZATION OF CARCINOEMBRYONIC ANTIGEN (CEA) IN NORMAL AND CANCEROUS HUMAN RECTOCOLONIC MUCOSA. (Eng.) Huitric, E.; Laumonier, R.; Burtin, P.; Von Kleist, S.; Chavanel, G.; (Centre Regional de Lutte Contre le Cancer, 76038 Rouen, France). *Lab. Invest.* 34(1):97-107; 1976.

An immunoenzymologic method using peroxidase-labeled antibodies was applied on frozen sections, on Araldite-embedded sections, and on isolated cell preparations of normal rectocolonic mucosa and of rectal and colonic cancers (adenocarcinomas and one villous tumor) for the localization of carcinoembryonic antigen (CEA). CEA appeared intimately associated with the external coating of the striated border of the normal columnar cell and with the external coating of the apical pole of the cancerous cell. CEA was also found as an intracellular component of the normal epithelial cell of the rectocolonic mucosa, mainly the goblet cell. In tumors, it appeared as an intracellular component of the mucous-secreting cell. Its presence in the cell coat and interior of the cell correlated with the degree of differentiation of the cells, whether cancerous or not. Progressive accumulation of CEA in the normal colonic epithelial cell was observed in cells undergoing maturation, and its release by the mature goblet cell was also observed. These results confirm that CEA is a normal glycoprotein constituent of the epithelial cell of the human adult rectocolonic mucosa, synthesized and discharged by this cell. The previously reported difference in CEA content between the cancerous and the normal rectocolonic mucosa appears to be quantitative and not qualitative.

3480 THE EVOLUTION OF CANCER OF THE COLON AND RECTUM. (Eng.) Muto, T.; Bussey, H. J. R.; Morson, B. C. (St. Mark's Hosp., City Road, London, EC1V 2PS, England). *Cancer* 36(6):2251-2270; 1975.

The malignant potential of adenomatous polyps and villous adenomas of the colon and rectum was analyzed. The material included 2,231 polyps and 275 cancers, which were wholly or partially macroscopically benign. The presence of contiguous benign and malignant tissue suggested that the cancer arose from a previously benign tumor. About 60% of the polyps were less than 1 cm in diameter, 20-25% were 1-2 cm and only 15-20% were over 2 cm in diameter. As polyps grew, cancer risk increased. Of the benign tumors, 75% were classified as adenomatous polyps, and only 10% were classified as villous adenomas. An intermediate or tubulo-villous architecture was noted in 15%. The malignant potential varied in relation to size and histological type. The very common adenomatous polyp under 1 cm in diameter had a 1% malignant potential, while the rare small villous tumor had a malignancy rate of 9.5%. The rare intermediate histological type had a 4% malignant potential. In tumors between 1-2 cm in diameter, the malignancy rate did not differ significantly for the three histological types, being 10.2%, 10.3%, and 7.4%, resp. Tumors over 2 cm in diameter had malignant potentials of 34.7%, 52.9%, and 45.8%, resp., for the three types. About 70% of all polyps showed mild atypia and had a malignant rate of 5.7%. Severe atypia occurred in 10% of the polyps, with 34.5% containing invasive cancer. Polyps graded as moderate atypic accounted for 20% of the whole and of these, 18.0% had invasive cancer. A gradual transition from benign to malignant situations, passing through stages of increasingly severe epithelial atypia before becoming invasive was suggested. The evolution of cancer from isolated adenomatous polyps took 10-15 yr. Cancer risk increased with the number of adenomas. Of the 1,199 patients with only one adenoma, 263 (21.9%) had cancer; of the 66 with three adenomas, 30 (45.5%) had cancer; of the 12 with five adenomas, 9 (75%) had cancer; and of the 16 with six or more adenomas, 11 (68.8%) had cancer. While evidence indicates that removal of polyps can be equated with prevention of cancer, this cannot be accurately measured at present.

3481 END RESULTS OF RADIATION THERAPY ALONE AND COMBINATION WITH 5-FLUOROURACIL IN COLORECTAL CANCERS.

(Eng.) Vongtama, V.; Douglass, H. O.; Moore, R. H.; Holyoke, E. D.; Webster, J. H. (Buffalo General Hosp., 100 High St., Buffalo, NY 14203). *Cancer* 36(6):2020-2025; 1975.

The clinicopathologic behavior of 148 patients with recurrent (95) and inoperable (53) colorectal cancers and their responses to and survival rates following irradiation alone or combined with 5-fluorouracil (5-FU) were investigated. Uninterrupted radiotherapy (1138 or 1250 RET) was applied in 118 cases and split course technique was used in 30 cases (1591 RET). Eleven patients received combined radiotherapy and surgery. Seventy-eight patients received a combination of 15 mg 5-FU and irradiation. Of the patients treated with split course technique, 87% had good to excellent responses, while only 70% of the patients with uninterrupted radiotherapy had the same response. The cumulative survival of all 148 patients was 20.6% at 24 months and 9.6% at 5 yr. Survival was more favorable in the patients with distant metastasis to lumbar spines and pelvic disease ($p<0.01$), and significantly higher survival was found for patients with pelvic disease in comparison to patients with only distant metastasis ($p<0.01$). A significantly higher survival rate ($p<0.05$) was found for the split course technique in comparison to uninterrupted radiotherapy. There was a significantly higher survival rate for patients treated with 5-FU in the inoperable group ($p<0.01$). It is concluded that the split course technique yields in comparison higher survival rates and longer palliation than does uninterrupted radiotherapy. Combined radiotherapy and 5-FU causes significantly higher survival rates in patients with inoperable colorectal cancers.

3482 ADJUVANT IMMUNOTHERAPY AND CHEMOTHERAPY IN COLORECTAL CANCER OF THE DUKES' C CLASSIFICATION: PRELIMINARY CLINICAL RESULTS.

(Eng.) Mavligit, G. M.; Gutterman, J. U.; Burgess, M. A.; Khankhanian, N.; Seibert, G. B.; Speer, J. F.; Reed, R. C.; Jubert, A. V.; Martin, R. C.; McBride, C. M.; Copeland, E. M.; Gehan, E. A.; Hersh, E. M. (M.D. Anderson Hosp. and Tumor Inst., 6723 Bertner Ave., Houston, TX 77025). *Cancer* 36(6):2421-2427; 1975.

Fifty-eight patients with Dukes' C classification of carcinoma of the large bowel were placed on adjuvant immuno- or chemoimmunotherapy with Bacillus calmette guerin (BCG) or combination of 5-fluorouracil (5-FU) plus BCG following primary and definitive surgery, and were followed for up to 21 months. Of 26 patients receiving BCG, alone, by scarification (6×10^8 viable organisms/week for 3 months, and then every other week thereafter), 5 had relapse with 75% of freedom from disease estimated at 15.1 months compared with 10.1 months in 73 selected histor ical controls who had surgery alone ($p=0.12$). The survival of all patients receiving BCG alone has not yet reached the 75 percentile, and the difference from controls is currently estimated at the 18% level. The combination of 5-FU (100 or 150 mg/m^2, 4 x daily for 5 days and repeated every 4 weeks) plus BCG (studied in 32 patients) appears to more effectively protect against tumor recurrence (75 percentile not yet reached compared with control, ($p=0.08$). The survival of patients on 5-FU plus BCG also appears to be improved ($p=0.09$). No patients have expired as compared to a 75 percentile survival of 16.6 months in the control. Serial determination of plasma carcinoembryonic antigen (CEA) was crucial in the clinical follow-up of these patients. Frequent CEA determinations led to early detection of clinical relapse. In the absence of any other unequivocal signs of relapse, a persistent and progressive elevation of CEA suggests tumor recurrence with a high degree of probability in patients with past history of cancer of the large bowel.

3483 FECAL BACTERIOLOGY OF COLONIC POLYP PATIENTS AND CONTROL PATIENTS.

(Eng.) Finegold, S. M.; Flora, D. J.; Attebery, H. R.; Sutter, V. L. (Wadsworth Hosp. Center, Los Angeles, CA 90024). *Cancer Res.* 35(11):3407-3417; 1975.

The fecal bacterial flora in feces from 25 subjects with colonic polyps (multiple adenomatous, large single, or single with atypia) and from 25 matched control subjects were investigated by detailed quantitative aerobic and anaerobic techniques, using a large battery of culture media under several atmospheric conditions. Over 55% of organisms detected on microscopic count were recovered anaerobically. When extremely oxygen sensitive anaerobes were present, they accounted for about 20% of the anaerobic flora. Although certain differences between the polyp and control patients were statistically significant, a few so called statistically significant differences occurred by chance alone. While the same genera (*Streptococcus*, *Eubacterium*, *Bifidobacterium*, and *Peptostreptococcus*) were often noted in this study, and in an earlier comparison of Japanese Americans on a Japanese diet versus those on a western diet, the species involved were always different. It is concluded that additional studies are necessary to investigate the interrelation between diet, intestinal bacteria, and bowel cancer.

3484 ARYLSULFATASE B IN COLORECTAL CANCER. (Eng.) Morgan, L. R., Jr.; Samuels, M. S.; Thomas, W.; Krementz, E. T.; Meeker, W. (Louisiana State Univ. Medical Center, 1542 Tulane Ave., New Orleans, LA 70112). *Cancer* 36(6):2337-2345; 1975.

Arylsulfatase B activity was determined in 24-hr urine samples and/or tissues from 243 patients with colorectal cancer and it was compared to that in 20 normal subjects. Elevated activity of the enzyme [9.8 ± 2.4 to 28.9 ± 9.2 mg of 5-nitrocatechol liberated/24-hr specimen/hr; these values were significantly different ($p<0.05$) from levels in normal urine] was observed in 172 patients. Employing Dukes' modified classification of colorectal cancer (type A, confined to the mucosa and submucosa; B, invasion through the muscularis with nodal metastasis; C, metastasis to regional lymph nodes; and D, metastasis to distant organs), urine arylsulfatase B activity was elevated in Dukes' A lesions (12%), Dukes' B lesions (55%), Dukes' C lesions (80%), and Dukes' D lesions (82%). Arylsulfatase B activity in urine, when elevated, may be used to follow response to therapy since in those patients with elevated urine arylsulfatase B values who subsequently responded to therapy, the enzyme values became or approached normal. Urine arylsulfatase B activity also correlated with plasma carcinoembryonal antigen (CEA) as a diagnostic indicator of colorectal cancer in 33 of 46 patients. In contrast to the urinary findings, arylsulfatase B activity in tumor tissue was elevated in only 27 of 110 of the specimens of colorectal cancer. In 55 patients treated with 5-fluorouracil, all of the 13 patients who showed objective response to therapy had activities of arylsulfatase B in the tumor tissue within the normal range for large bowel mucosa. Nevertheless, 22-26 of the 43 patients who did not respond also presented values in the normal range. It is concluded that increased cellular proliferation in colorectal cancer may be related to the changes in lysosomal arylsulfatase B activities. A pathogenic role for arylsulfatase and other lysosomal hydrolases is not peculiar to colorectal carcinoma, and has been noted in other diseases of the large bowel.

3485 ACUTE COLITIS IN THE RENAL ALLOGRAFT RECIPIENT. (Eng.) Perloff, L. J.; Chon, H.; Petrella, E. J.; Grossman, R. A.; Barker, C. F. (Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *Ann. Surg.* 183(1):77-83; 1976.

Four renal allograft recipients with evidence of ischemic damage to the colon are presented and compared with 11 cases from five major series. Similarities in the patients included: deterioration of renal function, multiple immunosuppressive and antibiotic regimens, the use of cadaver renal allografts, and diagnostic and therapeutic measures requiring frequent barium and ion-exchange resin enemas. Two of the four allograft recipients underwent surgery for the removal of segments of necrotic colon after several weeks of fever and abdominal pain that was initially attributed to either acute rejection, viral infection, or pancreatitis. One patient had 3 days of melena and responded to nonoperative therapy. The fourth patient developed ischemic colonic changes 10 weeks after allograft nephrectomy and was receiving no immunosuppressive therapy at the time. Broad spectrum antibiotics were used at various times in all patients. Early aggressive evaluation of gastrointestinal complaints--including barium enema, upper gastrointestinal series with small bowel follow-through, proctosigmoidoscopy or colonoscopy, and arteriography--is indicated, in view of the lethality of the complication of colonic ulceration. The clinical pictures presented emphasize the fact that renal allograft recipients are commonly heir to many complications that are rare in the normal population.

3486 ISCHEMIA OF THE COLON. (Eng.) O'Connell, T. X.; Kadell, B.; Tompkins, R. K. (Univ. California School Medicine, Los Angeles, CA). *Surg. Gynecol. Obstet.* 142(3):337-342; 1976.

A discussion of ischemic colitis as it occurred in 26 patients is presented. In 10 patients, the splenic flexure was the only involved portion of the colon. This portion was involved together with the descending colon in another seven patients. The sigmoid colon was the site in three patients, the total colon in three, multiple skip areas in two, and the right side of the colon in one patient. Barium enema was the most helpful roentgenologic examination in the 16 patients in whom it was performed. Mucosal irregularity was noted in 11, narrowed lumen in 6, thumbprinting in 5, stricture in 2, and perforation in 1 patient. Twelve patients had a history of significant atherosclerotic vascular disease. Three patients with atherosclerosis had ischemia secondary to cholesterol emboli of the colonic vasculature, two had occlusion of the inferior mesenteric artery with poor collateral supply, and three subjects were taking antihypertensive medications that may have caused ischemia of the colon. Eight patients had malinant disease of the hematopoietic reticuloendothelial system, five had leukemia, and two had lymphoma. Colonic ischemia was a terminal condition in eight patients. Conservative treatment was given to seven patients; this involves maintenance on fluids given i.v., intestinal intubation to decrease intraluminal pressure and minimize metabolic needs of the colonic wall, antibiotics to counteract invasion of intraluminal bacteria into or through damaged colonic wall, and a low molecular weight dextran to expand the intravascular volume and prevent sludging of the blood in the small colonic vessels. Five patients underwent hemicolectomy. It is suggested that early intervention be recommended if prompt response to conservative treatment does not appear, provided that associated diseases do not contra-indicate operation.

3487 BENIGN EXTRINSIC LESIONS OF THE LARGE BOWEL SIMULATING A CARCINOMA OF THE COLON: REPORT OF 16 CASES. (Fre.) Govoni, A. F. (234 Warner Ave., Roslyn Heights, NY 11577). *J. Radiol. Electrol. Med. Nucl.* 56(1):61-70; 1975.

Sixteen cases of benign extrinsic lesions involving the colon and producing roentgen findings simulating a neoplasm are reported. Details and x-ray photos of the 16 cases, which included 5 inflamed epiploic appendages, 4 congenital fibrous bands, 3 adhesions, 2 cases of pancreatitis, and 1 case each of a paricecal abscess and an endometriosis, are presented. Pain was the presenting symptom in nine of the cases. Hemorrhage was present in two cases, and symptoms of occlusion were present in two cases. In the majority of cases, radiological signs were indistinguishable from those of an intrinsic lesion. Neoplasm was considered as a diagnosis in four of the cases. It is concluded that a correct diagnosis can be made if history, clinical, and physical signs are thoroughly analyzed. Similar cases reported in the literature are also reviewed.

3488 CEA LEVELS IN PATIENTS WITH COLORECTAL POLYPS. (Eng.) Doos, W. G.; Wolff, W. I.; Shinya, H.; DeChabon, A.; Stenger, R. J.; Gottlieb, L. S.; Zamcheck, N. (Boston City Hosp., Boston, MA). *Cancer* 36(6):1996-2003; 1975.

Pre-operative plasma carcinoembryonic antigen (CEA) levels were measured in 93 patients with histologically defined colorectal adenomata removed at fibroptic colonoscopy to determine whether CEA levels are elevated in patients with colonic polyps or whether they vary with different histologic patterns. None of the patients had inflammatory bowel disease, previous history of carcinoma, or evidence of liver disease. Fifteen percent of the patients had elevated CEA levels (≥2.5 ng/ml), and two-thirds of these were between 2.5 and 4.0 ng/ml. Increased association of elevated CEA levels was noted with old age, villous adenomas (two- to fourfold), and increased tumor size (>2.3-cm diameter; twofold), but not with foci of dysplasia or carcinoma *in situ.* The following observations were made in seven of the 14 patients with elevated CEA levels: 2 patients had villous tumors with carcinoma *in situ,* 1 patient had a villous adenoma, 2 patients had mixed villous and tubular adenomas (with a high proportion of villous pattern), and 2 were subsequently shown to have carcinoma elsewhere in the colon. It is uncertain that the polyps were the source of the elevated circulating CEA levels; other factors including smoking and patient selection need to be considered. This preliminary study suggests that patients with colorectal adenomata and elevated circulating CEA may be at higher risk for the development of carcinoma. Further follow-up studies of the malignant potential of the polyp-bearing colon are essential.

3489 HEMORRHAGES OF THE COLON. (Fre.) Guillemin, G. (Centre Hospitalier Universitaire, Lyon, France). *J. Med. Strasbourg* 6(14):865-867; 1975.

3490 RADIOLOGICAL DISAGNOSIS OF HEMORRHAGES OF THE LOWER DIGESTIVE TRACT. (Fre.) Warter, P.; Tongio, J.; Barth, M.; Parisot, B. (Service de Radiologie du Pavillon Chirurgical A, C.H.U. Strasbourg, France). *J. Med. Strasbourg* 6(14):859-864; 1975.

3491 STENOSIS OF THE SIGMOID DUE TO ENDOMETRIOSIS. (Ger.) Lehmann, K.; Krug, A. (Chirurgische Universitatsklinik, Hospitalstr. 40, D-2300 Kiel, W. Germany). *Muench. Med. Wochenschr.* 118(6):167-170; 1976.

3492 CONTRIBUTION TO THE PROBLEM OF APPENDICITIS IN NEWBORN BABIES. (Ger.) Reuter, G.; Krause, I. (Stadt. Klinikum Berlich-Buch, 1115 Berlin-Buch, Karower Strasse 11, E. Germany). *Kinderaerztl. Prax.* 43(7):289-292; 1975.

3493 INTERNAL FISTULAE AS A RARE COMPLICATION OF PRIMARILY NON-DIAGNOSED HIRSCHSPRUNG'S DISEASE AFTER SURGERY. (Ger.) Jenny, P.; Penner, H.; Herzog, B. (Chirurgische Klinik, Kinderspital, CH-4058 Basel, Switzerland). *Helv. Chir. Acta* 42(4):591-593; 1975.

3494 SURVEY ON THE PROGNOSIS OF LARGE INTESTINAL ANASTOMOSES. (Ger.) Mutzner, F.; Amgwerd, R. (Chirurgische Klinik, Kantonsspital, CH-9006 St. Gallen, Switzerland). *Helv. Chir. Acta* 42(4): 583-589; 1975.

3495 ADHESIVE ILEUS OR PERFORATION PERITONITIS? CONTRIBUTION TO THE INDICATION OF SURGERY FOR ACUTE APPENDICITIS. (Ger.) Metzger, U.; Schwarz, H. (Chirurgische Abteilung, Spital Limmattal, CH-8952 Schlieren, Switzerland). *Helv. Chir. Acta* 42(4):571-573; 1975.

3496 ERRONEOUS DIAGNOSIS OF CROHN'S DISEASE IN CECAL CARCINOMA IN YOUNG PATIENTS. (Ger.) Sege, D. (Chirurgische Klinik, Kantonsspital St. Gallen, Switzerland). *Helv. Chir. Acta* 42(1/2):219-222; 1975.

3497 BEHCET'S SYNDROME AND TOXIC MEGACOLON. (Ger.) Roenspies, U.; Saegesser, F. (Hopital cantonal, CH-1011 Lausanne, Switzerland). *Helv. Chir. Acta* 42(1/2):209-212; 1975.

3498 INTESTINAL INVAGINATIONS DUE TO KNOWN CAUSES IN CHILDREN. (Ger.) Kaiser, G.; Bettex, M. (Chirurgische Kinderklinik der Universitat, CH-3010 Bern, Switzerland). *Helv. Chir. Acta* 42(4):567-570; 1975.

3499 USE OF SPECIFIC BACTERIOPHAGES IN THE COMPLEX TREATMENT OF PROCTOLOGICAL PATIENTS. (Rus.) Fedorov, V. D.; Marko, O. P.; Bronshtein, A. S.; Kamaeva, D. K.; Turovtseva, V. V. (Scientific Res. Inst. and Clinic Proctology, Russian SSR Ministry Health, Moscow, USSR). *Klin. Med.* 54(4):127-132; 1976.

3500 HISTOCHEMICAL CHARACTERISTICS OF THE SECRETORY ELEMENTS OF THE APPENDIX DURING SURGICAL TRAUMA, CIRCULATORY HYPOXIA AND IMMUNIZATION. (Rus.) Platash, V. I. (Zaporozhye Medical Inst., Zaporozhye, USSR). *Biull. Eksp. Biol. Med.* 81(1):91-94; 1976.

3501 SPIROCHETES IN THE INTESTINAL MUCOSA. (Rus.) Voino-Iasenetskii, M. V.; Snigirevskaia, E. S.; Belianin, V. L. (Inst. Experimental Medicine, SSR Acad. Medical Sciences, Leningrad, USSR). *Arkh. Patol.* 37(5):34-40; 1975.

3502 LESIONS OF THE APPENDIX EITHER SIMULATING ACUTE APPENDICITIS OR ACCOMPANYING ACUTE APPENDICITIS. (Rus.) Shalaev, M. I.; Kuz'min, A. A.; Miroliubov, N. F. (Arkhangelsk Medical Inst., Arkhangelsk, USSR). *Khirurgiia (Mosk.)* (7):33-36; 1975.

3503 PSUEDOMEMBRANOUS ENTEROCOLITIS IN ADULTS. (Fre.) Murat, J. (Centre Hospitalo-Universitaire, 37033 Tours Cedex, France). *Med. Chir. Dig.* 4(3):187-193; 1975.

3504 ERRORS AND DIFFICULTIES IN DIAGNOSIS OF THE CECUM ILEUS. (Rus.) Vitebskii, Ia. D.; Mereminskii, V. A. (Sverdlovsk Medical Inst. at Kurgan Oblast Hosp., Kurgan, USSR). *Vestn. Khir.* 115(8):107-110; 1975.

3505 TREATMENT OF PERIAPPENDICULAR ABSCESSES. (Rus.) Kubyshkin, V. A. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (7):29-33; 1975.

3506 ANESTHESIA DURING SURGERY FOR ACUTE APPENDICITIS. (Rus.) Gershman, B. M.; Minsker, G. D. (Municipal Hosp. No. 54, Moscow, USSR). *Khirurgiia (Mosk.)* (7):36-39; 1975.

3507 COMPLICATIONS OF DIVERTICULOSIS OF LARGE INTESTINE. (Rus.) Shirokova, K. I.; German, S. V. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Klin. Med. (Mosk.)* 53(8):60-65; 1975.

3508 ON PROGNOSTICATION OF THE RESULTS OF RADICAL SURGICAL TREATMENT OF RECTAL CANCER. (Rus.) Fedorov, V. D.; Zarudin, V. V.; Kartavenko, A. N.; Ul'ianov, V. I. (Smolensk Medical Inst., Smolensk, USSR). *Khirurgiia (Mosk.)* (9):47-51; 1975.

3509 JUVENILE POLYPS OF THE LARGE INTESTINAL MUCOSA. (Ger.) Sulser, H.; Deyhle, P.; Clavadetscher, P.; Ammann, R. (Institut fur Pathologische Anatomie, Schmelzbergstrasse 12, CH-8091 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 106(4):107-111; 1976.

3510 MOTOR ACTIVITY IN THE IRRITABLE COLON ASSOCIATED WITH A DUODENAL ULCER OR A CHOLELITHIASIS: PRE- AND POSTOPERATIVE CONSIDERATIONS. (Ita.) Pescatori, M.; Destito, C.; Maisano, A.; Wiel Marin, A. (Istituto di Clinica Chirurgica Generale e Terapia Chirurgica, Universita Cattolica del Sacro Cuore, Rome, Italy). *Chir. Patol. Sper.* 23(4):230-251; 1975.

See also, 3236, 3306, 3346, 3349, 3382, 3383, 3397, 3432, 3465, 3511, 3527, 3590, 3739, 3741, 3743, 3745, 3757, 3777, 3780, 3798.

LARGE INTESTINE

Ulcerative Colitis

3511 THE PATHOLOGY OF THE APPENDIX IN ULCERATIVE COLITIS. (Eng.) Jahadi, M. R.; Shaw, M. L. (2202 Avenue L, Galveston, TX 77550). *Dis. Colon Rectum* 19(4):345-349; 1976.

The involvement of the appendix was evaluated in 65 patients with chronic ulcerative colitis, and the histopathologic changes that occur in the appendix during this disease are described. Twenty-two patients had appendectomies prior to resection of the bowel: 17 could not be evaluated, two had nonulcerative acute appendicitis, one had fibrous obliteration of the appendiceal lumen, and two had normal appendices. In the remaining 43 patients, no section was taken from the appendix in seven patients; six were reclassified as having Crohn's disease; six appendices were normal; fibrous obliteration occurred in six; and peri-appendicitis was found in four cases. The appendices of the remaining 14 patients manifested some form of inflammatory change, and were classified as being in the acute phase of disease, the resolving phase, the remission phase, or as nonspecific inflammation. All but one of seven patients with ulcerative colitis in the active phase in the appendix had a similar stage of activity in the resected colon; the patient with dissimilarity in the stages had remission in the colon. Of the three patients in whom the inflammatory reaction in the appendix was the resolving phase, one had a combination of resolving and remission phases in the colon, one had active disease in the colon, and the third had similar changes in the appendix and colon. The histologic findings in the two locations in the one patient with disease in remission were similar. Both patients with nonspecific inflammatory reactions had active stage colitis in the colon. A patient with evidence of all three stages in the appendix had a similar histopathologic change in the colon. The findings reveal that 78% of the patients with appendiceal involvement had similar changes in the colon and appendix, indicating a positive correlation between the stages of disease in these two locations.

3512 THE DETECTION OF SEROLOGICAL FACTORS IN ACUTE ULCERATIVE COLITIS INDICATING A FAVOURABLE SHORT-TERM PROGNOSIS. (Eng.) Hunt, P. S.; Trotter, S. (Prince Henry's Hosp., St. Kilda Road, Melbourne, Victoria 3004, Australia). *Aust. N.Z. J. Surg.* 46(1):88-91; 1976.

Experiments were conducted to determine serological factors that are indicative of a favorable short-term prognosis in acute ulcerative colitis. Colonic epithelial cells were obtained from operation specimens and by biopsy at sigmoidoscopy from 16 patients with severe acute mucosal ulcerative colitis and from 11 control subjects with normal large-bowel mucosa. The ability of lymphocytes to release ^{51}Cr label from large intestinal epithelial cells was quantitatively assessed as percentage lymphocyte activity. The mean ± standard deviation of percentage lymphocyte activity in 16 patients with acute ulcerative colitis on admission to hospital (88 ± 8%) was significantly greater than that in 11 normal subjects (16 ± 8%, $p<0.01$). Samples of autologous serum were added to two reactions between lymphocytes and autologous large intestinal epithelial cells. The results in the seven patients who had emergency colectomy differed significantly from those in the nine who responded to corticosteroid treatments. The mean serological inhibition of lymphocyte activity in the group who had colectomy was 44 ± 16%, and in those responding to steroids it was 12 ± 5%. When the serum of these patients was studied for immunofluorescent autoantibodies to normal human colonic mucosa, none of the seven patients treated by colectomy had detectable autoantibodies, in contrast with three of the nine patients with a more favorable short-term prognosis (i.e., those who responded to steroid treatment). It is suggested that some patients have a serological factor that blocks the *in vitro* action of cytotoxic lymphocytes.

3513 THE DISEASE ACTIVITY OF ULCERATIVE COLITIS AND CROHN'S DISEASE. (Eng.) Talstad, I.; Gjone, E. (Haukeland Sykehus, 5000 Bergen, Norway). *Scand. J. Gastroenterol.* 11(4):403-408; 1976.

The disease activity in ulcerative colitis and Crohn's disease was studied in 114 patients with ulcerative colitis and in 44 patients with Crohn's disease affecting the large bowel (7), the small bowel (11), and both bowels (19). Parameters found to reflect the disease activity were given scores from 1 to 4. The score obtained by a patient was compared with the maximum scores, yielding a percentage of disease activity. In ulcerative colitis, highly significant regressions were found between the erythrocyte sedimentation rate (ESR), Hb, thrombocytes, serum albumin, immunoglobulin A, and the total binding capacity (TIBC, $p<0.001$ for all); less significant regressions were found for total serum protein, serum iron, and serum folic acid ($p<0.01$ for all). In Crohn's disease, the regression between the ESR and Hb ($p<0.001$), thrombocytes ($p<0.01$), and serum iron ($p<0.01$) resembled that found in ulcerative colitis. However, no significant regressions were found between the ESR and total serum protein, serum albumin, TIBC, and the Schilling test. Normal ESR was found in 10% of patients with severe Crohn's disease who had depressed total serum protein and albumin. The regressions between the percentage of disease activity and the ESR in ulcerative colitis and Crohn's disease were $p<0.001$ and $p<0.001$, resp. Mild, moderate, and severe ulcerative colitis or Crohn's disease roughly corresponded to the percentage disease activity of less than 30, 30-70, and greater than 70%, resp. It is proposed that these disease activities be used to define mild, moderate, and severe cases of ulcerative colitis and Crohn's disease.

3514 MUSCLE CELL ELECTROLYTES IN ULCERATIVE COLITIS AND CROHN'S DISEASE. (Eng.) Valentin, N.; Nielsen, O. V.; Olesen, K. H. (Abovaenge 4, DK-2700 Copenhagen, Brh., Denmark). *Digestion* 13(5):284-290; 1975.

The intracellular electrolyte concentrations in skeletal muscle, from 15 patients with ulcerative colitis or Crohn's disease, were examined to determine the possible influence of potassium supplements and glucocorticoid treatment on the muscle electrolytes. Groups I, II, and III consisted of patients with ulcerative colitis (3), Crohn's disease (3), and ileostomy (3). Diarrhea was common in groups I and II. The patients in group IV (two with diarrhea and one with ileostomy) all received regular daily potassium supplements (50-100 mmol/day). Group V consisted of three patients with Crohn's disease and one with ulcerative colitis, but no diarrhea. Group VI was a control group. Glucocorticoid treatment was given to patients in all groups. Maintenance doses of prednisone were usually 20-30 mg/day. Many patients in groups I-III had low values of plasma sodium. Intracellular potassium and magnesium were low in patients of groups I and II. There were significant ($p<0.01$) reductions of plasma sodium and of intracellular potassium and magnesium concentrations in the patients with diarrhea (groups I, II, and III). The patients receiving potassium supplements (group IV) appeared to have a roughly normal electrolyte composition, except for low values of plasma potassium. No electrolyte abnormalities were found in group V or VI. The results strongly suggest that the compositional abnormalities seen in groups I and II are characteristic of chronic diarrhea rather than ulcerative colitis and Crohn's disease. The data from patients with ileostomy (group III) were not conclusive.

3515 CURRENT DIAGNOSIS OF NONSPECIFIC ULCERATIVE COLITIS IN CHILDREN. (Rus.) Kanshina, O. A.; Tukina, G. M.; Ginzburg, S. N.; Ivanova, L. M. (Moscow Scientific Res. Inst. Epidemiology and Microbiology, Moscow, USSR). *Vopr. Okhr. Materin. Det.* 20(12):23-27; 1975.

3516 ULCERATIVE RECTOCOLITIS. SOMATIC ASPECTS. (Fre.) Barbier, P. (Rue de l'Ermitage 46, B-1050 Bruxelles, Belgium). *Acta Gastroenterol. Belg.* 38(11/12):431-444; 1975.

3517 PSYCHOLOGICAL ASPECTS OF ULCERATIVE RECTOCOLITIS. (Fre.) Duret-Cosyns, S. (Hopital Universitaire Saint-Pierre, Rue Haute 322, B-1000 Bruxelles, Belgium). *Acta Gastroenterol. Belg.* 38(11/12):445-453; 1975.

3518 ULCERATIVE RECTOCOLITIS: AUTOGENOUS TRAINING. ON SEVERAL SERIOUS CASES. (Fre.) Degossely, M.; Koninckx, N.; Lenfant, H. (Avenue Rogier 19, Bte 2, B-4000 Liege, Belgium). *Acta Gastroenterol. Belg.* 38(11/12):454-462; 1975.

3519 ON A POSSIBLE ROLE OF THE MICROBIAL FACTOR IN PATHOGENESIS OF ULCERATIVE COLITIS. (Rus.) Gokhberg, S. L.; Rasulev, N. I. (Scientific Res. Inst. Rural Medicine, Uzbek SSR Ministry Health, Tashkent, USSR). *Arkh. Patol.* 37(5):40-45; 1975.

3520 USE OF INDUCTOTHERMIA AND MICROWAVES IN THE COMPLEX TREATMENT OF PATIENTS WITH CHRONIC COLITIS. (Rus.) Nikoriukina, I. P. (N. A. Semashko Uzbek Scientific Res. Inst. Balneology and Physiotherapy, Tashkent, USSR). *Vrach. Delo* (12): 40-43; 1975.

See also, 3271, 3815.

PANCREAS

3521 THE PANCREAS IN CYSTIC FIBROSIS: CHEMICAL COMPOSITION AND COMPARATIVE MORPHOLOGY. (Eng.) Kopito, L. E.; Shwachman, H.; Vawter, G. F.; Edlow, J. (Harvard Medical Sch., Boston, MA 02115). *Pediatr. Res.* 10(8):742-749; 1976.

Sections of pancreas from 16 individuals who died with cystic fibrosis (CF) were classified by morphometric criteria into categories in increasing order of pancreatic involvement. In addition, biochemical studies of the pancreas from 35 patients who died of CF were undertaken, and the results were compared to the severity of pancreatic involvement. The concentration of acini, islets, main ducts, lobular ducts, connective tissue, and fat was compared with levels obtained in pancreatic tissue from 17 normal controls. In the least involved pancreases, from neonates who died under 5 months of age, acini were reduced to 33% of control levels and the following were increased: islets to 410%, lobular ducts to 250%, and main ducts to 1700% of controls. With increasing severity of the pancreatic disease, the acini were further reduced to 5% and lobular ducts to 37% of control levels, resp. Main ducts increased by 19-fold, and fatty infiltration accounted for more than 25% of the fresh weight of the pancreas in 9 of the 16 specimens. Comparative biochemical studies of 35 fibrocystic pancreases showed that water and volatile matter, normally accounting for 80% of the weight of the fresh pancreas, was reduced to less than 30% in the most affected organs. The concentration of zinc diminished from near normal mean levels of 193 μg Zn/g dry pancreas to 10% of this amount in the severely involved pancreas. Elevated concentrations of calcium, amounting to over 10 times control level, were found in obstructed ductal structures. Calcium was depleted from pancreatic sections adjacent to the obstructions. The following biochemical indicators were significantly different in their mean levels in the 35 fibrocystic pancreases when compared with the 17 controls: ($p \leq 0.001$) fat, water, zinc, calcium, copper, magnesium, potassium, and sodium ($p \leq 0.01$). It is concluded that biochemical changes in the pancreas are quantitatively related to the severity of pancreatic involvement in CF.

3522 SURGICAL ANATOMY OF THE PANCREATIC NERVES. (Rus.) Ageenko, I. A.; Gvazava, O. E. (Kuban Medical Inst., Krasnodar, USSR). *Khirurgiia* (1):93-98; 1976.

3523 EVALUATION OF DIFFERENT METHODS OF THE DETERMINATION OF DIASTASE IN URINE TO ESTABLISH THE DEGREE OF INFLAMMATORY CHANGES IN THE PANCREAS. (Rus.) Danielian, M. A.; Grigorian, E. G. (Scientific Res. Inst. Health Resorts and Physiotherapy, Armenian SSR Ministry Health, Erevan, USSR). *Lab. Delo* (3):154-155; 1976.

3524 CARCINOMA OF THE PANCREAS: CLINICAL SIGNS AND DIAGNOSTIC PROCEDURES. (Ger.) Schirmeister, J.; Krauth, G. (I. Med. Klinik d. Stadt. Krankenanstalten, D-7500 Karlsruhe, Moltkestr. 14, W. Germany). *Langenbecks Arch. Chir.* 339:259-266; 1975.

3525 FUNCTIONAL MORPHOCYTOCHEMICAL CHANGES IN THE LIVER IN CANCER OF THE PANCREATODUODENAL ZONE. (Rus.) Mikhailichenko, V. A.; Nekrasova, I. A.; Veselova, Z. P.; Andreeva, L. G. (Donetsk Medical Inst., Donetsk, USSR). *Vopr. Onkol.* 21(12):17-21; 1975.

3526 EXOCRINE PANCREAS DIAGNOSIS. PART 2: CONTINUOUS CONTROL OF α-AMYLASE ACTIVITY AND α-AMYLASE EXCRETION IN THE URINE, COMPARATIVE INVESTIGATIONS OF THE LIPASE AND α-AMYLASE ACTIVITY IN SERUM AND URINE, AND THE DIAGNOSTIC CONSEQUENCES AND DESCRIPTION OF AN EXPRESS METHOD FOR LIPASE DETERMINATION. (Ger.) Poge, A. W.; Schwokoski, C. F.; Brachmann, K. (Chirurgische Klinik der KMU, 701 Leipzig, Liebigstrasse 20a, E. Germany). *Z. Aerztl. Fortbild. (Jena)* 70(4):161-168; 1976.

3527 PSEUDO-OBSTRUCTION OF THE COLON IN LETHAL PANCREATIC NECROSIS (OGILVIE'S SYNDROME). (Ger.) Simonyi, I. (Rontgenabteilung des Krankenhauses "margit, " 1032 Budapest III, Becsi u. 132, Hungary). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 124(6):602-603; 1976.

3528 INDICES OF FAT AND CARBOHYDRATE METABOLISM AND OF THE ENDOCRINE FUNCTION OF THE PANCREAS IN CHRONIC ALCOHOLISM (PART II). (Rus.) Bondar', Z. A.; Starovoitova, S. P.; Gitel', E. P.; Makhov, V. M.; Ivanets, N. N.; Lifshits, N. A. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Ter. Arkh.* 48(3):20-25; 1976.

See also, 3246, 3262, 3265, 3275, 3304, 3427, 3461, 3576, 3680, 3704, 3705, 3709, 3732, 3739, 3748, 3749, 3792.

PANCREAS

Pancreatitis

3529 HEMORRHAGE IN THE PANCREATIC DUCT DURING THE EVOLUTION OF CHRONIC PANCREATITIS: OBSERVATION OF TWO NEW CASES. (Fre.) Gautier-Benoit, C.; Luez, J.; Vermesse, G.; Pinchon-Marsy, S.; Cecile, J. -P. (No affiliation given). *Lille Chir.* 30(4):74-76; 1975.

The difficulty of diagnosing hemorrhage in the pancreatic duct is illustrated in two cases of hemorrhage as a result of chronic pancreatitis. The first patient was hospitalized initially for pain in the hypochondrium. Acute pancreatitis was diagnosed on the basis of serum and urine amylase levels. The patient was treated medically and returned home. Two yr later, he was rehospitalized because of pain and bloody stools. Radiography of the gastrointestinal tract was negative as was arteriography of the celiac and mesenteric arteries. Anemia and bloody stools persisted, and further radiography revealed pancreatic calcification. A duodenoscopy detected blood at the level of the bile duct. A duodenopancreatectomy was performed. Histopathological examination of the excised pancreas confirmed the diagnosis of chronic pancreatitis and revealed a pseudocyst communicating with an artery and the pancreatic duct. The other patient developed chronic pancreatitis as a result of alcoholism. Anemia was attributed to the metabolic disorder. A duodenopancreatectomy was performed and fresh blood was observed in the pancreatic duct. Above the pancreatic duct, a necrotic area (about 1 cm^3 in size), which had ulcerated into the superior mesenteric vein, was discovered, accounting for the blood in the duct. Histopathological examination confirmed the diagnosis of chronic pancreatitis. Treatment of a ruptured blood vessel into the pancreatic duct can be accomplished by hemostasis followed by external or internal drainage of the pseudocyst or pancreatic ducts; however, excision of the involved area of the pancreas is preferable.

3530 INADEQUATE PARATHYROID RESPONSE IN ACUTE PANCREATITIS. (Eng.) Robertson, G. M., Jr.; Moore, E. W.; Switz, D. M.; Sizemore, G. W.; Estep, H. L. (Veterans Admin. Hosp., Richmond, VA 23298). *N. Engl. J. Med.* 294(10):512-516; 1976.

Nine consecutive hypocalcemic patients with acute pancreatitis were studied to elucidate the mechanism of hypocalcemia. Mean serum ionized calcium, 0.97 mM, was below the normal mean of 1.16 mM ($p<0.001$). Seven of eight patients tested had normal parathyroid hormone levels. All responded to parenteral parathyroid extract (200 U) by increasing serum ionized calcium and urinary cyclic AMP, indicating parathyroid hormone responsive target organs. Calcitonin and glucagon concentrations were increased above normal in some patients, but there was no relation with serum ionized calcium. Parenteral glucagon had no significant effect on serum ionized calcium or calcitonin concentrations. These findings suggest that neither glucagon nor calcitonin was primarily responsible for the hypocalcemia, which did not produce expected increases in serum parathyroid hormone concentrations. It is suggested that relative parathyroid insufficiency may account for the persistent hypocalcemia observed in patients with acute pancreatitis.

3531 PANCREATITIS AND ITS COMPLICATIONS IN THE ANGIOGRAPHIC PICTURE. (Cze.) Chvojka, J.; Krupicka, M. (Vojenska nemocnica, Plzen, Marxova 13, Czechoslovakia). *Cas. Lek. Cesk.* 114(25);777-779; 1975.

3532 FUNCTIONAL PSYCHOSES AND NEUROLOGICAL CRISES IN PANCREATITIS. (Ger.) Feurle, G. (Medizinische Poliklinik der Universitat, 69 Heidelberg, Hospitalstrasse 3, W. Germany). *Med. Klin.* 70(26):1148-1149; 1975.

3533 THE PRESENCE OF ASCITES IN CHRONIC PANCREATITIS. (Por.) de Barros Mott, C.; Guarita, D. R.; Brandao Barros, M. I.; Conte, V. P.; Machado, M. C. C.; Bove, P.; Raia, A.; Bettarello, A. (Hospital das Clinicas de Sao Paulo, Sao Paulo, Brazil). *Arq. Gastroenterol.* 12(4):245-249; 1975.

3534 VARIANTS OF THE COURSE OF ACUTE PANCREATITIS. (Rus.) Dorogan', D. A.; Kobyliatskii, I. T. (Dnepropetrovsk Medical Inst., Dnepropetrovsk, USSR). *Vrach. Delo* (9):66-69; 1975.

3535 CLINICAL AND DIAGNOSTIC ASPECTS OF ACUTE PANCREATITIS IN CHILDREN. (Rus.) Ankudinov, F. S.; Savostin, A. I. (Yuzhno-Sakhalinsk Municipal Hosp., Yuzhno-Sakhalinsk, USSR). *Vestn. Khir.* 115(8):69-71; 1975.

3536 PARADUODENAL CYSTS CLOSE TO THE AMPULLA OF VATER AND CHRONIC PANCREATITIS. (Fre.) Vankemmel, M.; Paris, J. C.; Houcke, M.; Laurent, J. C.; Burzynski, A. (Cite Hospitaliere, 59000 Lille, France). *Med. Chir. Dig.* 4(3):181-185; 1975.

3537 TREATMENT OF CHRONIC PANCREATITIS WITH DIFFERENT DOSES OF CONTRICAL. (Rus.) Loginov, A. S.; Timoshina, I. V. (Central Scientific Res. Inst. Gastroenterology, Principal Admin. of Moscow Municipal Executive Committee, Moscow, USSR). *Sov. Med.* (10):79-83; 1975.

3538 SURGICAL TREATMENT OF PATIENTS WITH ACUTE PANCREATITIS. (Rus.) Petrov, V. P.; Shiriaev, L. A. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Vestn. Khir.* 115(8):26-31; 1975.

3539 VASCULAR FACTOR IN ETIOLOGY OF ACUTE PANCREATITIS IN ELDERLY AND SENILE PATIENTS. (Rus.) Andreitsev, A. N.; Kulikovskii, N. N.; Volodin, N. P.; Andreitseva, V. A. (Moscow Medical Inst. Stomatology, Moscow, USSR). *Klin. Med. (Mosk.)* 53(11):56-61; 1975.

See also, 3247, 3262, 3304, 3421, 3487, 3576, 3791.

LIVER AND BILIARY TRACT

3540 THE CONSTITUTIONAL INDOCYANINE GREEN EXCRETORY DEFECT: REPORT OF FOUR CASES. (Eng.) Namihisa, T.; Nambu, M.; Kobayashi, N.; Kuroda, H. (Juntendo Univ. Sch. Medicine, Hongo 3-1-3, Bunkyo-ku, Tokyo, 113 Japan). *Gastroenterol. Jpn.* 10(1):70-76; 1975.

Case reports of four patients with high indocyanine green (ICG) secretory defects and without overt liver diseases are reported. The ICG retention rate at 15 min after a single i.v. injection of 0.5 mg/kg ranged from 69.4% to 78.4%, while the BSP retention rate at 45 min after an injection of 5 mg/kg ranged from 2.9% to 6.0%. The plasma disappearance rate of ICG ranged from 0.017 to 0.025, while the plasma disappearance rate of BSP ranged from 0.069 to 0.126. The transfer rate of ICG from plasma to liver decreased by two on the study of compartmental analysis, and a slightly reduced transfer rate of BSP from plasma to liver was also observed. The step formation was observed on both the ICG and BSP disappearance curves, 20-25 min after the injection, in all cases and in repeated observations. The serum containing

ICG or BSP was eluted through Sephadex G-200, and the eluted serum protein fraction showed three peaks (I, II, and III in order of elution). The ICG binding capacity of serum protein decreased in the first peak and increased in the third peak. Light microscopic findings showed the increase of lipofuscin-like lysome, modification and paracrystalline-like array of mitochondria, and increase of reticulum fiber in Disse's space. The father of one of the patients showed ICG retention without BSP retention. Five cases with this discrepancy of dyes in three generations of a kindred are known, and the characteristic impaired hepatic removal of ICG in these cases was suspected to be congenital or constitutional. The results suggest that the subjects reported in this study exhibit a new type of the dye excretory disorder associated with heredity.

3541 ENDOTHELIAL AND BILE CANALICULAR ALKALINE PHOSPHATASE IN HUMAN LIVER AND SERUM.

(Eng.) Hagerstrand, I.; Lindholm, K.; Lindroth, Y. (Malmo General Hosp., S-214 01 Malmo, Sweden). *Scand. J. Clin. Lab. Invest.* 36(2):131-135; 1976.

Evidence to support identification of endothelial and bile canalicular alkaline phosphatase isoenzymes in serum samples is presented. In addition, the relation between hepatic and serum increases in bile canalicular isoenzymes was studied. The alkaline phosphatase in homogenates of human liver was separated into two components by the addition of Triton X-100 to an agarose gel electrophoretic system. One of these components migrated at a rate identical to that of the original one and at a rate similar to alpha$_2$-macroglobulin. The other component migrated more slowly, at a rate that resembled that of beta$_1$-transferrin. Human serum samples regularly contained an identical fast-migrating fraction, whereas an identical slowly migrating fraction only appeared in serum obtained from patients with various diseases, especially from patients with malignant tumors, even though the liver did not contain tumor metastases. Slow isoenzyme was found in a few sera that had alkaline phosphatase activity within the normal range. Histochemical examinations of liver tissue from patients whose serum contained the slowly migrating isoenzyme showed a pronounced reaction of alkaline phosphatase in the bile canaliculi, and this isoenzyme seemed to arise from the canaliculi. It is suggested that the fast-migrating isoenzyme arises from the endothelial cells of the liver to which the activity is usually confined in histochemical stainings. It is also suggested that malignant tumors, collagen diseases, and chronic biliary obstruction increase bile canalicular isoenzyme in serum.

3542 MORPHOLOGICAL ASPECTS OF THE LYMPH VESSEL SYSTEM OF THE LIVER.

(Ger.) Huth, F. (Pathologisches Institut der Universitat, D-4000 Dusseldorf, Moorenstrasse 5, W. Germany). *Leber Magen Darm* 4(6):262-273; 1974.

Morphologic aspects of the lymph vessel system of the liver are described. The system originates in capillaries ending blindly in interlobular septa. The lymphatic capillaries do not have basal membranes. Physiologic and electron microscope studies have shown that intercellular spaces of the endothelium of the lymphatic vessels allow rapid resorption of high molecular proteins, corpuscular substances, and cells by the surrounding tissue. Lymphostasis in the liver can be brought about experimentally by ligating efferent lymph vessels, by blocking the ductus thoracicus, by encapsulating the liver, or by displacing the liver. Hepatic lymphostasis in man is to be expected in cases where there are inflammatory-fibrotic processes, tumors, or certain pathologic processes caused by parasites in the hilar area; it can also be seen in cases of aplasia or hypoplasia of the lymphatic vessels of the liver. In experimental cholestasis, as well as in biliary obstructive diseases in man, bile flow into the lymphatic system occurs as a compensatory mechanism. Consequently, lymphostasis aggravates the effects of cholestasis experimentally. Intrahepatic lymphangitis has been described in a few patients with hepatitis. Ascension of infections to the liver by way of the lymphatic system from a pericholecystitic or another inflammatory focus has never been proven. The increase in number and diameter of lymphatic vessels in cirrhosis of the liver has been proven by endoscopic, radiographic, and anatomical investigations. However, the role of the hepatic lymph vessel system in many other liver diseases has yet to be clarified.

3543 ULTRASTRUCTURAL ALTERATIONS IN LIVERS WITH METASTASIS.

(Eng.) Albukerk, J.; Duffy, J. L. (Health Sciences Center, State Univ. New York at Stony Brook, Stony Brook, NY). *Arch. Pathol. Lab. Med.* 100(3):168-171; 1976.

Thirteen biopsy specimens of livers that contained metastatic carcinoma were examined with the electron microscope. Degenerative alterations of the mitochondria, cystic dilatation of the endoplasmic reticulum, increased amounts of osmiophilic material, some in various stages of autophagocytosis, and lipid vacuoles within the hepatocytes were observed. In 10 of 13 cases, the hepatocytes demonstrated mitochondrial paracrystalline inclusions of various sizes (0.8μ-3μ). The observation of the latter structures in edematous hepatocytes containing phospholipid-rich osmiophilic deposits supports the hypothesis that paracrystalline inclusions are caused by the precipitation of unmasked phospholipids. The spectrum of ultrastructural findings suggests hypoxia and impaired lipid metabolism of the hepatic tissue as a result of congestion and bile stasis caused by the tumor nodules.

3544 STUDIES OF LIVER FUNCTION AND STRUCTURE IN PATIENTS WITH GALLSTONES BEFORE AND DURING TREATMENT WITH CHENODEOXYCHOLIC ACID.

(Eng.) Fromm, H.; Holz-Slomczyk, M.; Zobl, H.; Schmidt, E.; Schmidt, F. W. (Medizinische Hochschule, D-3 Hannover 61, Postfach 610 180, W. Germany). *Acta Hepatogastroenterol (Stuttg.)* 22(6):359-369; 1975.

Liver function and structure were studied before and during the treatment of 12 patients with radiolucent gallstones. Patients received chenodeoxycholic acid (CDCA, 20 mg/kg/day) for 3-22 months. No signs of hepatotoxicity were observed. Activities of several enzymes, including transaminases, glutamate dehydrogenase, and γ-glutamyl transferase were frequently abnormal in this group of patients; however, there was no statistically significant difference between treatment and pretreatment levels. Serum bilirubin and protein electrophoresis remained normal throughout the study. The BSP retention test was not significantly altered by CDCA treatment. Light microscopic examination in eight patients revealed no changes of liver structure during 3-19 months of CDCA administration, except for a decrease in fatty changes in three patients; in these patients, changes affected 25-50% of hepatocytes before treatment. The ultrastructure of liver cells was normal in five patients in whom electron microscopy was also done. The evidence suggests that CDCA is a safe and effective drug for the treatment of radiolucent gallstones.

3545 DIAGNOSIS OF CYSTIC LESIONS OF THE LIVER WITH SPECIAL REFERENCE TO THE VALUE OF DIAGNOSTIC ULTRASOUND. (Eng.) Thijs, L. G.; Snel, P. (Free Univ. Hosp., Amsterdam, Netherlands). *Neth. J. Med.* 18(6):234-244; 1975.

All cases of cystic liver disease encountered in a hospital during the last 9 yr were reviewed with emphasis on diagnostic procedures. Eighteen patients with liver cysts were traced from the available records, but the presence of liver cysts was not suspected clinically in 12 cases. A liver scan was performed in only five patients of the whole series. In three patients, the cysts were less than 3 cm in diameter, which is generally considered clinically undetectable. In all other patients, the cysts were large enough to have been discovered if looked for with presently available diagnostic methods. Ultrasound is a valuable diagnostic tool, and case histories of four patients in whom ultrasonic investigations of the liver were carried out are presented. Several factors should be considered in the decision of which sequence of tests to follow for a particular patient including: inconvenience and hazards for the patient and specific skill and experience of the investigator. Based upon present experience, it is concluded that a radioisotope should be the first diagnostic step in a case of suspected cystic lesion of the liver, and ultrasonic examination should be the second.

3546 THE CURRENT STATUS OF α-1-ANTITRYPSIN, A PROTEASE INHIBITOR, IN GASTROINTESTINAL DISEASE. (Eng.) Sharp, H. L. (Univ. Minnesota Hosps., Minneapolis, MN 55455). *Gastroenterology* 70(4):611-621; 1976.

The relation between extremely deficient levels of α-1-antitrypsin (α1AT), a glycoprotein synthesized in the liver, and predisposition to the development of cirrhosis and emphysema is reviewed. Cirrhosis, characterized by a distinctive hepatocyte abnormality (eosinophilic cytoplasmic globules), usually has its onset in childhood. Depressed levels of α1AT are also observed in celiac disease and peptic ulcers, and minimal glomerular lesions are frequently observed in the postmortem examination of cirrhotics. Emphysema associated with α1AT deficiency is characterized by onset in early adulthood, equal sex distribution, and predisposition for the lower lobes. Respiratory distress syndrome in the newborn has been associated with low levels of α1AT on a nongenetic basis. Pathogenic hypotheses are discussed for both liver and lung lesions. Treatment is largely supportive. Steroids have been tried, but have generally been without demonstrable effect. Liver transplant resulted in a return of serum α1AT to normal levels, but the two patients in whom this was tried died of complications of the procedure. It is concluded that although biochemical advances in defining the nature of α1AT deficiency are progressing, the pathogenesis of the disease remains an enigma.

3547 OBSERVATIONS OF INCREASED LEVELS OF BLOOD COAGULATION FACTORS AND OTHER PLASMA PROTEINS IN CHOLESTATIC LIVER DISEASE. (Eng.) Cederblad, G.; Korsan-Bengtsen, K.; Olsson, R. (Sahlgren's Hosp., S-413 45, Goteborg, Sweden). *Scand. J. Gastroenterol.* 11(4):391-396; 1976.

The levels of blood coagulation factors and other plasma proteins in eight primary biliary cirrhosis (PBC) patients were compared with the levels in seven patients with common duct stone (CDS) and six patients with chronic active hepatitis (CAH). The PBC and DCS patients generally had coagulation factor levels above 100%. In contrast, the CAH patients generally had median values of the different hemostatic factors below 100%. Statistically significant differences were observed between CAH and PBC patients for all hemostatic factors except VIII, IX, and XI and between CAH and CDS patients for all hemostatic factors except II, VII, VIII, X, and XII. All the PBC patients had immunoglobulin (Ig) M and ceruloplasmin values above the normal range in the laboratory. In contrast, the CAH patients had beta$_{1c}$/$_{1a}$-globulin and orosomucoid values below the lower reference limit. All the CDS patients showed ceruloplasmin values above the upper reference limit. In comparison with the PBC and CDS patients, the CAH patients had significantly lower levels of orosomucoid, ceruloplasmin, beta$_{1c}$-$_{1a}$-globulin, beta$_{1e}$-globulin, and a higher level of IgG. The CDS patients differed from PBC patients in having significantly lower IgM and ceruloplasmin levels and higher transferrin levels. The results indicate that there is an increase of wide range of liver synthesized proteins in cholestatic liver disease.

3548 IS CHOLESTASIS DUE TO MICROFILAMENT FAILURE? (Eng.) French, S. W. (Univ. California Sch. Medicine, Davis, CA). *Hum. Pathol.* 7(3):243-244; 1976.

The hypothesis that cholestasis is due to the failure of microfilaments to contract is reviewed. Evidence indicates that microfilaments are located in the pericanalicular region and that the pericanalicular microfilaments contain contractile proteins. It has also been shown that agents known to affect microfilament function, such as cytochalasin B, also cause cholestasis. Evidence that bile flow is mediated through cyclic contraction and relaxation of the microfilaments is indirect and circumstantial. Some characteristics of bile flow and bile pressure suggest that a smooth muscle-like action is involved. Cholestasis could result from any agent that interferes with the hormone receptor-stimulated contraction of the pericanalicular microfilaments. It is suggested that direct evidence linking hormonal receptor-mediated microfilament contraction to bile flow is necessary to establish whether microfilaments play a role in bile flow and cholestasis.

3549 BILE ACIDS IN RECURRENT BENIGN CHOLESTASIS. (Fre.) Levy, V. G.; Bereziat, G. (C.H.U. Saint-Antoine, 184, Rue du Faubourg-St.-Antoine, F 75571 Paris Cedex 12, France). *Nouv. Presse Med.* 4(36):2599-2600; 1975.

Bile acid (BA) rates were determined (Sandberg modified Roovers technique) in three patients with benign recurrent cholestasis. In the first two patients (mother and daughter), a vesicular lithiasis accompanied the cholestasis; the mother also had jaundice during all of her five pregnancies. The third patient had very high BA rates at each recurrence. High BA rates in his father support the familial character of this illness. High BA rates were also found during remission in all three patients; this may be indicative of the latent illness, causing a disorder in bile excretion, or it may be indicative of a primary excess of BA synthesis, requiring cholestyramine treatment. The presence of biliary lithiasis supports the first hypothesis.

3550 PROGRESSION IN HEMOCHROMATOSIS. (Fre.) Bercovici, J. P.; Leuzinger, D. (C.H.U., 29279 Brest Cedex, France). *Nouv. Presse Med.* 4(31):2257-2258; 1975.

The case of a 42-year-old diabetic patient with hemochromatosis who developed a cancer of the liver accompanied by polycythemia, alpha-fetoprotein secretion, and hypoglycemia is presented. The tumor grew rapidly, and nodal, pleuropulmonary, endocardial, and adrenal metastases appeared. Blood volume increased due to liver cirrhosis. Polycythemia necessitated the removal of 5.6 l of blood in 2 months. There was also a sizable drop in blood iron levels in the liver, most probably related to the blood removal and the iron consumption of an exacerbated erythropoiesis. High rates of the latter were noted in the plasma and in the hepatic tumor. The patient died from cardiac arrythmia with complete auriculoventricular dissociation. It appears that the liver is active in the biological inactivation of erythropoietin. The high degree of plasmatic erythropoietic activity in certain patients with hepatoma and polycythemia suggests the disappearance of a feedback mechanism followed by inappropriate synthesis of a protein that is identical or similar to erythropoietin. Alpha-fetoprotein is usually associated with a primary liver cancer.

3551 REYE SYNDROME: TREATMENT BY EXCHANGE TRANSFUSION WITH SPECIAL REFERENCE TO THE 1974 EPIDEMIC IN CINCINNATI, OHIO. (Eng.) Bobo, R. C.; Schubert, W. K.; Partin, J. C.; Partin, J. S. (Univ. Cincinnati Coll. Medicine, Cincinnati, OH). *J. Pediatr.* 87(6):881-886; 1975.

The treatment of 66 patients with Reye's syndrome established by hepatic biopsy or autopsy is described. Particular attention is given to 26 patients treated during the 1974 epidemic in Cincinnati. Prior to the utilization of exchange transfusion early in the course of disease, the case fatality rate was 100% in nine patients. With early diagnosis and early exchange transfusion, the case fatality rate was reduced to 27% in 44 patients. During the 1974 epidemic of Reye's syndrome, 18 of 26 children who were treated were diagnosed by hepatic biopsy; 16 received one or more exchange transfusions. There were no deaths among these 26 patients. During the 1974 epidemic, the national case fatality rate was estimated at 40%. It is proposed that both early diagnosis and prompt exchange transfusion improve survival in children with Reye's syndrome and that prompt action by the practicing pediatrician can reduce the case fatality rate by 50% or more.

3552 THORIUM INDUCED HEPATIC HEMANGIOENDOTHELIOMA. ROENTGEN-ANGIOGRAPHIC FINDINGS IN TWO ADDITIONAL CASES WITH CLINICAL "INFORM AND CONSENT" PROBLEMS. (Eng.) Curry, J. L.; Johnson, W. G.; Feinberg, D. H.; Updegrove, J. H. (Easton Hosp., Easton, PA 18042). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(3):671-677; 1975.

Two cases of presumed thorium induced hemangioendothelioma of the liver are reported. A 52-yr-old woman presented with a subjective feeling of generalized puffiness. A chest roentgenogram showed thorium deposits in the liver, spleen, and lymph nodes. There were marked increases in alkaline phosphatase and SGOT levels. The patient underwent thorotrast cerebral angiography 26 yr previously. One yr after presentation, the patient showed weight loss and a slightly enlarged liver. Two yr following, there was severe pain, a markedly enlarged liver, and hepatomegaly. Celiac angiography revealed hepatic replacement by large vascular lakes, which remained opacified for more than 30 sec. The patient continued to lose ground and died 4.5 yr after initial presentation. The autopsy revealed microscopic hemangioendothelioma in the bone marrow, adrenal gland, and kidney. In the bone marrow specimens, angiosarcomas were accompanied by regional thorium deposits, which were not present within the malignant cells. A 54-yr-old acutely ill man also showed roentgenological evidence of thorium deposits and large diffused vascular lakes, which opacified for 45 sec. This patient also had a thorotrast cerebral angiogram 28 yr previously. The patient underwent an emergency laparotomy because of severe bleeding, but expired 8 days postoperatively. These are the first reports of angiography of the thorotrast liver, before and after clinical evolution of malignancy. It is suggested that angiography may have therapeutic and prognostic value in such cases.

3553 OBSERVATIONS ON THE ORAL ADMINSTRATION AND TOXICITY OF VINYL CHLORIDE IN RATS. (Eng.) Feron, V. J.; Speek, A. J.; Willems, M. I.; van Battum, D.; de Groot, A. P. (Central Inst. Nutrition Food Res. [CIVO] TNO, Utrechtseweg 48, Zeist, Netherlands). *Food Cosmet. Toxicol.* 13(6): 633-638; 1975.

The p.o. administration of vinyl chloride monomer (VCM) and its toxicity were studied in male and female Wistar rats. Upon storage, solutions of VCM in soybean oil appeared to be stable with respect to their VCM content and the fatty acid composition of the oil. In addition, no oligomers of vinyl chloride or reaction products of VCM with components of the oil were detected. Gastric incubation of such solutions was considered an acceptable method of p.o. administration of VCM to rats in short-term toxicity studies. Within 4 hr following intragastric intubation of VCM in soybean oil (300 mg VCM/kg), over 92% of the VCM administered was recovered from the gases excreted by the animals. Eructation did not appear to be involved in the excretion of VCM. VCM dissolved in soybean oil was administered by gavage to male and female rats at 0, 30, 100, and 300 mg/kg, once daily for 6 days per week for 13 weeks. Several hematological, biochemical, and organ weight values differed significantly from those of the controls, but these differences were considered to have only minor, if any, toxicological significance. A slight increase in liver-to-body weight ratio occurred in males and females at the highest level. This increase was not accompanied by liver damage, as was evident from histological examination, enzyme histochemistry, and electron microscopy. The no-effect level in this 90-day study was conservatively placed at 30 mg VCM/kg body weight, but it was probably higher, since the effects occurring at 100 and 300 mg/kg body weight were of doubtful toxicological significance. The results indicate that feeding rats with diets containing polyvinyl chloride (PVC) powder with a high VCM content is a more practical method for the long-term p.o. exposure of rats to VCM than is stomach intubation of VCM in oil. VCM was almost completely released from PVC powder during passage through the digestive tract.

3554 RELIABILITY OF TWO COLOR TESTS FOR THE DETERMINATION OF ALANINE AND ASPARTATE AMINOTRANSFERASE IN HEPATOBILIARY DISEASES. (Ger.) Kunz, I.; Holzel, D.; Seidel, R.; Holzel, W. (Med. Klinik Bezirkskrankenhaus, 99 Plauen [Vogtl.], Reichenbacher Strass 42, Germany). *Z. Gesamte Inn. Med.* 30(16):555-556; 1975.

3555 HEPATOGENIC ASCITES. (Ger.) Seidel, R.; Holzel, D. (Med. Klinik, Bezirkskrankenhaus, 99 Plauen [Vogtl.], Reichenbacher Strasse 42, Germany). *Z. Gesamte Inn. Med.* 30(16):532-535; 1975.

3556 BEHAVIOR OF SULFOBROMOPHTHALEIN AND GALACTOSE CLEARANCE IN VARIOUS HEPATOPATHIES: COMPARATIVE ASSESSMENT. (Ita.) Fiaccadori, F.; Aurier, E.; Pelosi, G. (Cattedra Clinica delle Malattie Tropicali e Subtropicali Universita Parma, Parma, Italy). *Fegato* 20(2):117-134; 1974.

3557 PLASMA ANDROGENS FOLLOWING ORAL ADMINISTRATION OF TESTOSTERONE. INFLUENCE OF SEX, AGE, AND LIVER FUNCTION. (Ger.) Nieschlag, E.; Cuppers, H.-J.; Wickings, E. J.; Kruskemper, H. L. (Medizinische Klinik und Poliklinik, Universitat Dusseldorf, Dusseldorf, Germany). *Dtsch. Med. Wochenschr.* 100(36):1773-1780; 1975.

3558 DIAGNOSIS AND RESULTS OF SURGICAL MANAGEMENT IN CARCINOMA OF THE LIVER. (Ger.) Sugahara, K.; Kawano, N.; Shirakura, T.; Mitani, S.; Ishikawa, K. (Chirurgische Universitatsklinik, Tokyo, Japan). *Leber Magen Darm* 5(2):62-65; 1975.

3559 HYPERCALCEMIA IN PATIENTS WITH PRIMARY CARCINOMA OF THE LIVER WITHOUT BONE METASTASES. (Fre.) Belaiche, J.; Vesin, P.; Kalifat, R.; Milhaud, G.; Cattan, D. (Nouvel Hopital de Villeneuve-Saint-Georges, 40, allee de la Source F 94190 Villeneuve-Saint-Georges, France). *Arch. Fr. Mal. App. Dig.* 64(1):21-29; 1975.

3560 PROPOSAL FOR AN IMPROVED DETERMINATION OF THE LIVER SIZE BASED ON SCINTIGRAPHY. (Ger.) Brase, A.; Pfeiffer, E.; Jahns, E. (Institut fur Nuklearmedizin und Biophysik Medizinischen Hochschule, Hannover, Germany). *Nucl. Med. (Stuttg.)* 14(1):52-59; 1975.

3561 NEW DATA ON THE TREATMENT OF SERIOUS HEPATIC INSUFFICIENCY. (Fre.) Opolon, P. (Unite de Soins Intensifs, C.H.U. Saint-Antoine, 184, rue du fg Saint-Antoine, 75012 Paris, France). *Entretiens Bichat Ther.* 1975:153-156.

3562 ULTRASONIC ECHOGRAPHIC FINDINGS IN HEPATOMAS. (Fre.) Charbonnier, A.; Cachin, M.; Nepveux, P.; Launois, J.-P.; Schuller, Ch.; Fluteau, G.; Fluteau, D. (Hopital Cochin, 27, rue du Faubourg-Saint-Jacques, F 75674 Paris Cedex 14, France). *Ann. Med. Interne (Paris)* 126(11):761-766; 1975.

3563 HISTOENZYMATIC DISEASES IN CERTAIN LIVER DISEASES. (Rus.) Krystev, L.; Tashev, T.; Brailski, Khr.; Stoianov, St.; Kolarski, V.; Borov, B.; Popov, A.; Donchev, N.; Braikov, N. (Inst. Gastroenterology, Sofia, Bulgaria). *Klin. Med.* 53(10):42-48; 1975.

3564 CATECHOLAMINES IN LIVER DISEASES. (Pol.) Stelmasiak, T. (Klinika Ogolna Chorob Wewnetrznych, Instytut Chorob Wewnetrznych, ul. Staszica 16, 20-081 Lublin, Poland). *Pol. Arch. Med. Wewn.* 54(4/10):363-368; 1975.

3565 TREATMENT OF HEPATOGENOUS HYPOTONIA WITH THE NEW CIRCULATION STIMULANT BAYROTREN.® (Ger.) Naief, F. (Parksanatorium Bad Bertrich, 6222 Geisenheim/Rh., W. Germany). *Therapiewoche* (35):4607-4609; 1975.

3566 THE BILIARY AND URINARY EXCRETION OF IOPANOIC ACID: PHARMACOKINETICS, INFLUENCE OF BILE SALTS, AND CHOLERETIC EFFECT. AN EXPERIMENTAL STUDY IN BILE-FISTULA DOGS. (Eng.) Berk, R. N.; Loeb, P. M.; Cobo-Frenkel, A.; Barnhart, J. L. (Univ. Texas Southwestern Medical Sch., Dallas, TX). *Radiology* 120(1):41-48; 1976.

3567 THE VALUE OF LABORATORY TESTS IN THE DIAGNOSIS OF CHOLESTASIS. (Nor.) Ritland, S. (Rikshospital, Norway). *Tidsskr. Nor. Laegeforen.* 95(5):286-289; 1975.

3568 DRUG METABOLIZING CAPACITY OF THE LIVER IN HEPATOBILIARY DISEASES. (Spa.) Gonzalez Macias, J.; Herreros Fernandos, V.; de Castro del Pozo, S. (Catedra de Patologia General, Salamanca, Spain). *Rev. Clin. Esp.* 136(2):123-130; 1975.

3569 CHANGES OF HEMOSTASIS IN LIVER DISEASES: I. VALUE OF BIOLOGICAL TESTS IN THE DIAGNOSIS OF CERTAIN AFFECTIONS. (Spa.) Rocha, E.; Marin, J.; Ortega, J.; Borrasca, L. (Facultad Medicina, Universidad de Navarra, Pamplona, Spain). *Rev. Clin. Esp.* 136(3):219-226; 1975.

3570 EFFECTIVENESS OF PERITONEAL DIALYSIS IN THE TREATMENT OF REYE'S SYNDROME. (Spa.) Ruiz Gomez, D.; Moya R. de Larramendi, A. (Hospital del Sagrado Corazon, Barcelona, Spain). *Rev. Esp. Pediatr.* 21(182):239-246; 1975.

3571 HEPATIC VEIN INVOLVEMENT IN ASSOCIATION WITH HYDATID CYST DISEASE. (Fre.) Bourgeon, R.; Mouiel, J.; Borelli, J.-P.; Etienne, A. (Clinique Chirurgicale de Nice, France). *Chirurgie* 101(4):250-257; 1975.

3572 ACUTE HEMODILUTION AND NORMAL BLOOD VOLUME: POSSIBILITY OF MAJOR SURGICAL OPERATIONS WITHOUT TRANSFUSION. A CASE OF ESOGASTRECTOMY IN A JEHOVAH'S WITNESS. (Fre.) Testas, P.; Benichou, J.; Wyplosz, J.; Bach, B.; Place, G.; Monod-Broca, Ph. (No affiliation given). *Chirurgie* 101(4):266-271; 1975.

3573 ENCEPHALOPATHY AND FATTY DEGENERATION OF VISCERA. (Dan.) Boysen, G.; Gomez, M. R. (No affiliation given). *Ugeskr. Laeger.* 136(49): 2748-2751; 1974.

3574 HEPATITIS DUE TO ECHINOCOCCIC SENSITIVITY. (Fre.) Hureau, J.; Benit, Ch.; Picard, R.; Delavierre, Ph. (No affiliation given). *Chirurgie* 101(3):199-201; 1975.

3575 INTRAHEPATIC CHOLESTASIS. (Fre.) Pavel, I. (6, Intrarea Caragiale, Bucarest, Rumania). *Sem. Hop. Paris* 51(18):1195-1198; 1975.

3576 ALTERATION OF PANCREATOBILIARY HYDROELECTROLYTIC RESPONSE TO SECRETIN STIMULATION IN DIFFUSE HEPATIC DISEASE. (Spa.) Colombato, L.; Parodi, H. (Policlinico Alejandro Posadas, Martinez de Hoz y Marconi, Heado, Peia de Bs. As., Argentina). *Acta Gastroenterol. Latinoam.* 6(2):51-54; 1975.

3577 HYPERLIPOPROTEINEMIA IN LIVER DISEASE. (Ger.) Seidel, D. (Medizinische Universitatsklinik, Bergheimerstrasse 58, D-69 Heidelberg, Germany). *Schweiz. Med. Wochenschr.* 105(27):857-862; 1975.

3578 THE MEANING OF HEPATIC ARTERY LIGATION IN SURGERY. (Dut.) Eyskens, E. (Universitaire Instelling Antwerpen en A.Z. Sint-Raphael K.U.L., Antwerp, Belgium). *Acta Chir. Belg.* 74(3): 339-349; 1975.

3579 HYPERCALCEMIA AND LIVER CANCER. (Fre.) Belaiche, J.; Vesin, P.; Milhaud, G.; Kalifat, R.; Cattan, D. (Nouvel Hopital, F 94190 Villeneuve-Saint-Georges, France). *Arch. Fr. Mal. App. Dig.* 64(3):274; 1975.

3580 DISORDERS IN BLOOD CLOTTING AND PLATELET FUNCTION IN LIVER DISEASE. (Ger.) Breddin, K.; Lechner, K.; Krohl, R. (Zentrum Innere Medizin, Universitat, 6 Frankfurt/Main, Theodor-Stern-Kai 7, Germany). *Therapiewoche* 25(22):3113-3126; 1975.

3581 INTRALUMINAL CALCIFICATION OF THE PORTAL VEIN. (Ger.) Koischwitz, D.; Schirmer, G. (Radiologische Klinik, Universitat Bonn, 53 Bonn-Venusberg, W. Germany). *Fortschr. Roentgenstrahl.* 122(6):559-561; 1975.

3582 AMINO ACIDS AND PEPTIDES IN THE URINE OF HEALTHY CHILDREN AND CHILDREN WITH DISORDER OF THE FUNCTION OF THE LIVER PARENCHYMA. (Slo.) Kahanec, D.; Adam, J.; Grega, B.; Adamova, M. (Krajska detska nemocnica, Moyzesova 9, 040 00 Kosice, Czechoslovakia). *Cesk. Pediatr.* 30(7/8): 339-343; 1975.

3583 INTRAHEPATIC LITHIASIS. (Cze.) Charvat, A.; Kalny, J.; Meduna, J.; Slezak, Z. (Fakulta detsteho lekarstvi University Karlovy, 110 00 Prague 1, Vlasska 36, Czechoslovakia). *Cas. Lek. Cesk.* 114(25):757-763; 1975.

3584 CHANGES OF THE LEVEL OF ACETOIN IN THE BLOOD OF PATIENTS WITH LIVER DISEASES AFTER INTRAVENOUS ADMINISTRATION OF ALPHA-LIPOIC ACID. (Cze.) Jezek, P.; Horecka, J. (Lekarska fakulta University J. E. Purkyne, 625 00 Brno-Bohunice, Jihlavska 100, Czechoslovakia). *Cas. Lek. Cesk.* 114(45):1389-1392; 1975.

3585 POST-TRAUMATIC INTRAHEPATIC ANEURYSMS. (Pol.) Jesiposicz, M.; Klamut, M.; Dacka, E.; Bieganowska, Z. (Instytutu Chirurgii AM, 20-090 Lublin, ul. Jaczewskiego 8, Poland). *Pol. Przegl. Chir.* 48(1):9-15; 1976.

3586 MODERN SERUM DIAGNOSIS OF LIVER DISEASES: PART I. (Ger.) Simon, K. H. (8 Munich 71, Allgauer Strasse 57, W. Germany). *Med. Monatsschr.* 29(6):274-277; 1975.

3587 MODERN SERUM DIAGNOSIS OF LIVER DISEASES: PART II. (Ger.) Simon, K. H. (8 Munich 71, Allgauer Strasse 57, W. Germany). *Med. Monatsschr.* 29(7):326-328; 1975.

3588 MODERN SERUM DIAGNOSIS OF LIVER DISEASES: PART III. (Ger.) Simon, K. H. (8 Munich 71, Allgauer Strasse 57, W. Germany). *Med. Monatsschr.* 29(8):376-379; 1975.

3589 HEPATIC METASTASES OF CANCER OF THE DIGESTIVE TRACT. FREQUENCY, PROGNOSIS AND SURGICAL POSSIBILITIES. (Fre.) Huguier, M. (Hopital Rotschild, 43, bd de Picpus, 75571 Paris Cedex 12, France). *Ann. Gastroenterol. Hepatol.* 11(4):305-312; 1975.

3590 HEPATIC METASTASES OF COLORECTAL CANCERS. ANATOMICAL, BIOLOGIC AND CLINICAL FACTS HELPING A THERAPEUTIC CHOICE. (Fre.) Marchal, G.; Clauss, B. (Service de Chirurgie C, C.H.U. St-Eloi, 34059 Montpellier Cedex, France). *Ann. Gastroenterol. Hepatol.* 11(4):253-281; 1975.

See also, 3066, 3144, 3145, 3259, 3263, 3272, 3274, 3277, 3279, 3285, 3289, 3291, 3293, 3294, 3295, 3308, 3309, 3327, 3420, 3438, 3525, 3604, 3656, 3668, 3669, 3672, 3674, 3684, 3805, 3807, 3808, 3809, 3810.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

3591 BILIRUBIN AND PARANITROPHENOL GLUCURONYL TRANSFERASE ACTIVITIES OF THE LIVER IN PATIENTS WITH GILBERT'S SYNDROME: AN ATTEMPT AT A BIOCHEMICAL BREAKDOWN OF THE GILBERT'S SYNDROME. (Eng.) Auclair, C.; Hakim, J.; Boivin, P.; Troube, H.; Boucherot, J. (Unite de Recherches 24 de l'INSERM, Hopital Beaujon, F92110 Clichy, France). *Enzyme* 21(2):97-107; 1976.

Hepatic bilirubin (Bil-GT) and paranitrophenol glucuronyl transferase (PNP-GT) activities were measured in 26 patients with Gilbert's syndrome (GS) and in 1 patient with Crigler-Najjar type syndrome. Three groups of patients in GS were distinguished. In the first group, Bil-GT activity was decreased by 25% of that of the controls, and PNP-GT activity was normal. In the second group, Bil-GT was decreased by 25% of that of the controls, and PNP-GT was decreased by 50% of that of the controls. In the third group, Bil-GT was decreased by 50% of that of the controls, and PNP-GT activity was normal. In the Crigler-Najjar syndrome type 2, Bil-GT activity was 25% of that of the controls, and PNP-GT was 10% of that of the controls. The authors hypothesize that (a) the subjects of the third GS group were probably heterozygous to the homozygous disease that affected the subjects of the first GS group, and (b) the subjects of the second GS group were most likely heterozygous to the homozygous disease that affected the patient with Crigler-Najjar type 2. It is concluded that the proposed GS classification scheme requires confirmation.

3592 THE DUBIN JOHNSON SYNDROME: ULTRASTRUCTURAL STUDIES [Abstract]. (Eng.) Lamberty, J.; Coover, J. (Veterans Admin. Hosp., New Orleans, LA 70112). *Tex. Rep. Biol. Med.* 33(2):355-356; 1975.

See also, 3146, 3637.

Nonviral Hepatitis and Hepatic Injury

3593 UNDIFFERENTIATED PATTERNS OF KEY CARBOHYDRATE-METABOLIZING ENZYMES IN INJURED LIVERS: I. ACUTE CARBON-TETRACHLORIDE INTOXICATION OF RAT. (Eng.) Taketa, K.; Tanaka, A.; Watanabe, A.; Takesue, A.; Aoe, H.; Kosaka, K. (Okayama Univ. Medical Sch., 5-1 2-Chome, Shikata-cho, Okayama 700, Japan). *Enzyme* 21(2):158-173; 1976.

An undifferentiated pattern of key glycolytic, gluconeogenic, and pentose phosphate pathway enzymes was studied in carbon tetrachloride-injured male Sprague-Dawley rat liver, and it was compared with enzyme patterns in livers of various differentiated states. Acute carbon tetrachloride injury caused marked increases in activities of low hexokinase (18.9), glucose-6-phosphate dehydrogenase (101), phosphofructokinase (53), aldolase A (104), and pyruvate kinase M_2 (1.073 mU/mg protein) with concomitant decreases in activities of high hexokinase (1.8), glucose-6-phosphatase (35.4), fructose-1,6-diphosphatase (125), aldolase B, and pyruvate kinase L (89 mU/mg protein) as compared with the activities in control starved rats. These changes following carbon tetrachloride intoxication were different from enzyme changes induced by dietary alteration such as starvation and refeeding on a high carbohydrate fat-free diet, and were similar to those found in less differentiated liver tissues such as fetal liver and hepatoma AH 130. The deviation of hepatectomized animals from the adult liver group was minimal, indicating that the regenerating liver after partial hepatectomy was fairly well differentiated in enzyme composition. It is also suggested that refed and starved livers can be readily distinguished by their enzyme patterns.

3594 METHYLDOPA-INDUCED LIVER INJURY: RAPID PROGRESSION TO FATAL POSTNECROTIC CIRRHOSIS. (Eng.) Thomas, E.; Bhuta, S.; Rosenthal, W. S. (New York Medical Coll., Fifth Ave. at 106th St., New York, NY 10029). *Arch. Pathol. Lab. Med.* 100(3):132-135; 1976.

The case of a 55-yr-old woman who developed symptoms suggestive of hepatitis 12 weeks after first receiving methyldopa for hypertension is presented. Liver biopsy showed chronic aggressive hepatitis with subacute hepatic necrosis. Methyldopa was discontinued, but after exhibiting transient clinical improvement, the patient's condition progressively deteriorated until she died of hepatic failure, in spite of therapy with massive doses of corticosteroids and other nonspecific measures. During the terminal stage, a considerable decrease in the size of the liver was observed. At autopsy, the liver was found to be small, shrunken, and scarred; histological sections demonstrated postnecrotic cirrhosis. Such a rapid progression of methyldopa-induced liver injury is undoubtedly rare, but it may be prevented by careful supervision of patients who exhibit liver function abnormalities early in the course of therapy.

3595 ISONIAZID LIVER INJURY: CLINICAL SPECTRUM, PATHOLOGY, AND PROBABLE PATHOGENESIS. (Eng.) Mitchell, J. R.; Zimmerman, H. J.; Ishak, K. G.; Thorgeirsson, U. P.; Timbrell, J. A.; Snodgrass, W. R.; Nelson, S. D. (Natl. Heart and Lung Inst., Bldg. 10, Room 8N-115, Natl. Insts. Health, Bethesda, MD 20014). *Ann. Intern. Med.* 84(2):181-192; 1976.

A blind prospective evaluation of the prevalence and course of isoniazid associated liver injury was conducted in 358 hospitalized male psychiatric patients. All patients were housed in buildings where an outbreak of tuberculosis had occurred. Almost two-thirds of the patients were tuberculin reactors and received isoniazid. Patients who received 0.007-15.5 μg/ml isoniazid had a higher frequency of SGOT elevations than controls. Of 173 patients who completed at least 24 weeks of isoniazid therapy, 66 had at least one SGOT value of 30+ mU/ml, and 23 had at least one value of 60+. The frequency of SGOT abnormalities increased with the age of patients. Eight of the 23 had abnormal total bilirubin concentrations (greater than 1.2 mg/dl). In seven of these, elevation of total bilirubin concentration coincided both chronologically and proportionally with the degree of SGOT abnormality, showing that the elevated SGOT values were indicative of liver injury. Only 10 of 123 patients in whom the rate of isoniazid metabolism was determined during the 48th week of study had a positive fluorescent antinuclear antibody test. No antibodies to isoniazid were detected in any of the sera. It is concluded that the actual frequency of isoniazid related hepatic damage is difficult to determine, because many of the patients received other potentially hepatotoxic drugs concomitantly, particularly phenothiazine tranquilizers. Administration of isoniazid to this population caused hepatic injury in at least 10.5% and possibly in 22.9% of the patients.

3596 GRANULOMATOUS HEPATITIS ASSOCIATED WITH ACQUIRED TOXOPLASMOSIS IN ADULTS. (Fre.) Martinez-Vazquez, J. M.; Guardia, J.; Pahissa, A.; Moragas, A.; Mirada, A.; Tornos, J.; Bacardi, R. (Dept. Internal Medicine, Free Univ., Barcelona, Spain). *Sem. Hop. Paris* 51(14):963-965; 1975.

The case of a 34-yr-old man with granulomatous hepatitis associated with acquired toxoplasmosis is presented. The patient presented with prolonged fever hepatomegaly, and splenomegaly. Hepatic biopsy revealed small granulomas, which were bordered by epithelioid cells and round cells with fibrinoid necrosis. Positive tests included: antitoxoplasm antibodies (immunofluorescence, IgM 1/300, IgG 1/1,200), and complement fixation with the toxoplasmic antigen (1/64); sero-agglutination was specific (1/256). The patient was treated with pyrimethamine and sulfadiazone leading to a rapid regression of the fever and disappearance of the granulomas. The diagnosis of toxoplasmosis is supported by the serological data, especially the presence of IgM antibody, specific agglutination, and complement fixation with the toxoplasmic antigen; all were present during the acute phase of the illness and subsequently diminished. The relation between the granulomas and the toxoplasmosis seems likely, since the granulomas disappeared following therapy, and the patient fully recovered.

3597 HEALING LIVER WOUNDS DUE TO ACUTE RADIATION INJURIES. (Rus.) Guseva, L. N.; Artishevskii, L. I. (Minsk Medical Inst., Minsk, USSR). *Khirurgiia* (1):45-48; 1976.

3598 THE EFFECT OF α-TOCOPHEROL AND CORTISONE ON SOME BIOCHEMICAL CHARACTERISTICS OF ALLERGIC HEPATITIS. (Rus.) Linchevskaia, A. A. (Tadzhik Medical Inst., Dushanbe, USSR). *Patol. Fiziol. Eksp. Ter.* (5):45-47; 1975.

3599 HEPATIC CLEARANCE OF ENDOGENOUS BILIRUBIN AFTER SADAMIN (XANTHINOL NIACINATE) IN BRUCELLOSIS-INDUCED HEPATOCELLULAR DAMAGE AND IN CHRONIC HEPATITIS. (Pol.) Juszczyk, J.; Kiczka, W.; Adamek, J.; Kryska, A.; Salwa, W.; Biczysko, W.; Zengteler, G.; Swietlicka-Grala, J. (Instytut Chorob Wewnetrzynych AM, 61-003 Poznan, ul. Wincentego 1, Poland). *Pol. Tyg. Lek.* 30(31/32):1303-1305; 1975.

3600 LIGHT AND ELECTRON MICROSCOPIC CHANGES IN CHRONIC HEPATIC LESIONS OF A PERSON EXPOSED TO TRINITROTOLUOL EFFECT. (Hun.) Kendrey, G.; Laszlo, B.; Rozsahegyi, I. (Orszagos Munkaegeszegugyi, Intezet, Bucharest, Rumania). *Egeszsegtudomany* 19(2):154-161; 1975.

See also, 3464, 3618.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

3601 EPIDEMIOLOGY AND MODE OF TRANSMISSION OF VIRAL HEPATITIS A AND B. (Eng.) Deinhardt, F. (Rush-Presbyterian-St. Luke's Medical Center, 1753 West Congress Parkway, Chicago, IL 60612). *Am. J. Clin. Pathol.* 65(5):890-897; 1976.

The epidemiology and mode of transmission of viral hepatitis A (HA, epidemic or short incubation period hepatitis), hepatitis B (HB, homologous serum or post-transfusion hepatitis), and hepatitis C are reviewed. The incidence of hepatitis on a worldwide basis increased from 1959-1971 with a steady decline thereafter. About 40,000-50,000 cases of HA and 6,000-9,000 cases of HB are reported annually in the United States. It ranks fourth on a list of notifiable infectious diseases. Hepatitis A is usually transmitted by the anal-oral route and occurs endemically and epidemically (principally fecal contamination of food, drinking water, and swimming pools or lakes). Hepatitis B is transmitted by direct inoculation, but probably almost as frequently by nonparenteral routes (saliva or droplet infection from upper respiratory secretions) and is usually endemic. Hepatitis C, which is non-A-non-B hepatitis, occurs after transfusion and may account for more cases of post-transfusion hepatitis than HA and HB together. Both HA and HB can be diagnosed accurately by their respective antigens and corresponding antibodies. In contrast, little is known about the characteristics of HC.

3602 VIRAL HEPATITIS IN PAEDIATRIC AGE. (Eng.) Tolentino, P. (Dept. Infectious Diseases, Univ. Genoa, Genoa, Italy). *Paediatrician* 4(2/3): 93-102; 1975.

Recent advances in the epidemiology of hepatitis A and B viruses and the discovery of Australia antigen are reviewed. Viral hepatitis has a high lethality, as much as 30%, during early infancy and the first semester of life, and it presents some puzzling diagnostic problems in neonates. Hepatitis in older children represents a minor problem as most cases are mild, anicteric or subicteric, with a mild course and short duration. In the school age child, there is a higher incidence of icteric and prolonged diseases. Approaching the pubertal age, the disease more closely resembles the adult forms. Cholestatic forms, characterized by prolonged high values of bilirubinemia and itching, are infrequent in childhood. Fulminant forms are a major problem due to a massive hepatic necrosis and are clinically characterized by a new peak of fever, increasing icterus, neurological and psychical signs, and hemorrhages. Mild cases of hepatitis in childhood require no special treatment, except rest and a diet rich in proteins and carbohydrates and poor in lipids and salts. Ascorbic acid, B-complex, and non-17-alkylated protein anabolic steroids may be useful. Cortisone is not indicated in HBAg-positive cases as it may cause relapses and allow evolution to the chronic form. Cortisone may be indicated in the cholestatic forms. In fulminant hepatitis, several therapies are proposed including glucocorticoids in high dosage, hyperimmune serum or gammaglobulins, levodopa, heparin in high dosage, exsanguine transfusion or plasmapheresis, hemodialysis and peritoneal dialysis, cross-circulation with baboons, or extracorporeal circulation in pig's liver. These different techniques can be employed to permit liver regeneration in the case of partial necrosis. Temporary improvement of the clinical, biochemical, and sometimes histological findings were obtained in children with chronic hepatitis by using the anti-inflammatory and immunoderepressive treatment with glucocorticoids and azathioprine formerly employed in adults.

3603 GENETIC FACTORS AND AUTOIMMUNITY IN VIRAL HEPATITIS. (Eng.) Hug, G. (Univ. Cincinnati Med. Coll., Cincinnati, OH 45229). *Am. J. Clin. Pathol.* 65(5):870-875; 1976.

Studies on genetic factors and autoimmunity in viral hepatitis are reviewed, and the finding of hepatitis B surface antigen (HBsAg) in 166 children with a variety of diseases is reported. The development of the HBsAg carrier state may depend upon a patient's genome. The HBsAg subtypes may reflect the viral genome and may be of prognostic significance. The hepatitis B virus surface antigen of a given individual can be expressed as HBsAg/adw. Different subtypes predominate in different populations throughout the world. Altered immune response, as in patients with Down's syndrome, may increase the HBsAg carrier rate (30% in Down's syndrome as compared with 10% in other conditions of mental retardation). The difference between the carrier rates of the two patient groups indicates that patients who have Down's syndrome are particularly susceptible to becoming HBsAg carriers. Auto-antibodies have been used to differentiate various types of hepatitis. There is an increased incidence of histocompatibility antigen HL-A1 and HL-A8 in patients who have chronic aggressive hepatitis. In primary hepatic carcinoma, the HBsAg carrier rate is increased. Because neonatal hepatitis, biliary atresia, and choledochal cyst may all result from infantile obstructive cholangiopathy, with the precise outcome depending upon the presence of other conditions such as α_1-antitrypsin deficiency, a study of HBsAg was made in 166 children. They had a variety of diseases including Reye's syndrome, α_1-antitrypsin deficiency, and renal disorders. The HBsAg rate in the sera of these patients was normal.

3604 FAMILIAL CLUSTERING OF HEPATITIS B ANTIGEN AND LIVER DISEASES IN FAMILIES WITH A HIGH INCIDENCE OF VIRAL HEPATITIS. (Eng.) Piccinino, F.; Manzillo, G.; Sagnelli, E.; Balestrieri, G.; Maio, G. (First Medical Sch., Univ. Naples, Via D. Cotugno 1, 80135 Naples, Italy). *Infection* 3(2):99-104; 1975.

Twenty-three families, in which two or more cases of acute hepatitis-like jaundice (index cases) occurred, all were studied to evaluate hepatitis B antigen (HBAg) clustering and the incidence of asymptomatic liver disease. There were 49 "index cases" of hepatitis-like jaundice: 38 cases of acute viral hepatitis, 5 of chronic aggressive hepatitis, and 6 of active cirrhosis. The overall number of members in these families (excluding index cases) was 170, and 155 of these were tested by clinical examination, laboratory tests, and needle liver biopsy. In 27 of the 155 subjects, there was evidence of liver diseases (10 non-icteric hepatitis cases, 12 CAH cases, and 5 cirrhosis cases). HBAg was present in the serum of 19 of these patients, and 2 of the cirrhotic patients were positive. Furthermore, 33 of the 155 cases were healthy HBAg carriers who showed no abnormality in liver function tests. In the majority of these carriers, liver histology showed slight damage (pin-head necrosis or portitis), sometimes compatible with resolving viral hepatitis. A long-term follow-up of the HBAg carriers showed that three of these subjects progressed to acute viral hepatitis. Of 163 children, 35% had HBAg-positive liver disease and 19% were healthy HBAg carriers; this compared with incidences of 9.8% HBAg-positive liver disease and 4.9% HBAg carriers in 41 parents. The high frequency of both acute and chronic asymptomatic liver disease demonstrates the value of complete clinical investigation of the contacts when a case of viral hepatitis occurs in a family. It is suggested that genetic factors may be responsible for the development of a previously acute viral hepatitis to a chronic state.

3605 HEPATITIS B ANTIGEN IN INFANTS BORN TO MOTHERS WITH CHRONIC HEPATITIS B ANTIGENEMIA IN TAIWAN. (Eng.) Anderson, K. E.; Stevens, C. E.; Tsuei, J. J.; Lee, W.-C.; Sun, S.-C.; Beasley, R. P. (Rockefeller Univ. Hosp., New York, NY). *Am. J. Dis. Child.* 129(12):1389-1392; 1975.

Studies were undertaken to determine whether infants born to hepatitis B antigen (HBAg) carriers develop hepatitis B antigenemia. HBAg was detected by complement fixation (CF) in serum samples of 7.5% of 1,106 pregnant Chinese women tested in Taipei, Taiwan. HBAg persisted in all but one of 42 women followed for 1-18 months (average, 9 months) after delivery, and 27 of the 43 infants born to those women became antigen-positive. Persistence of the antigen was more common than transient or intermittent antigenemia. Twelve had antigenemia when first tested, while 15 later developed antigenemia, usually during the first 6 months of life. Only one infant developed antibody to HBAg (anti-HBAg), and this occurred after transient antigenemia. The HBAg was found in 2 of 32 fathers, and in 18 of 27 older siblings. The antigen was more common among siblings of antigen-positive than among those of antigen-negative infants. These findings demonstrate that in Taiwan, infants born to mothers who are asymptomatic carriers of HBAg commonly become infected by hepatitis B virus. Exposure of infants near the time of birth may be important in maintaining the high, chronic HBAg carrier rate in Taiwan.

3606 CELLULAR PATHOPHYSIOLOGY OF HEPATITIS. (Eng.) Trump, B. F.; Kim, K. M.; Iseri, O. A. (Univ. Maryland Sch. Medicine, 31

South Green St., Baltimore, MD 21201). *Am. J. Clin. Pathol.* 65(5):828-847; 1976.

The cellular pathophysiology of hepatitis is described, and a new hypothesis concerning the sequence of events in hepatic parenchymal cells is presented. The initial event involves virus-hepatocyte interaction, possibly involving antibody and complement. This results in damage to the plasma membrane, increasing the passive permeability to ions and involving inactivation of the transport pumps or ATPases within the structure. More serious events involve the exchanges of calcium between the cell and the extracellular fluid and between various compartments within the cell. Calcium is sequestered normally in segregation sites within the mitochondria. If this process is interfered with, these granules disperse and the calcium becomes more evenly distributed in the mitochondria. This mobilization of Ca can activate the phospholipases, which attach to the mitochondrial inner membranes, resulting in release of fatty acids and changes in membrane integrity that are apparently dependent on lipid protein interactions. These effects are initially reversible, although they are more severe in cases of subacute massive hepatitis with massive necrosis. The reactions proceed to the point where the mitochondria and cell membrane cannot self repair, even following removal of the injurious agent; this results in irreversible cell damage. It is concluded that the role of ion and water movements in the cytoplasm, with attendant sequential changes in organelle function is the key to understanding viral hepatitis.

3607 LIGHT MICROSCOPIC MORPHOLOGY OF VIRAL HEPATITIS. (Eng.) Ishak, K. G. (Armed Forces Inst. Pathology, Washington, DC 20306). *Am. J. Clin. Pathol.* 65(5):787-827; 1976.

The histopathology of acute and chronic infections associated with viral hepatitis is reviewed and illustrated with particular emphasis on the changes in chronic viral hepatitis. The various stages of uncomplicated and complicated viral hepatitis and its sequelae are discussed including: the active and subsiding phases of acute classic viral hepatitis, acute viral hepatitis with submassive necrosis or massive necrosis, acute cholestatic viral hepatitis, chronic hepatitis B antigen (HBAg) carrier, post hepatitis cirrhosis, chronic persistent viral hepatitis, active viral hepatitis, and cholestatic viral hepatitis. The i.v. drug abuser who has hepatitis is identified by the presence of particulate birefringent material (usually talc) in reticuloendothelial cells, as well as tissue eosinophilia. Ground glass hepatocytes are characteristic of the HBAg carrier. They may be present in chronic persistent and chronic active hepatitis and in cirrhotic livers with or without hepatocellular carcinoma. Ground glass cells, which contain the surface component of the HBAg, can be stained specifically by a number of stains including aldehyde fuchsin and orcein. The cirrhotic liver of the HBAg seropositive patient may show liver cell dysplasia, a premalignant change.

3608 A CORRELATION BETWEEN HISTOCOMPATIBILITY ANTIGENS HL-A 1 AND 8 AND IMPROVED DEFENSE AGAINST HEPATITIS B VIRUS IN PATIENTS WITH CHRONIC UREMIA. (Fre.) Jungers, P.; Descamps, B.; Zingraff, J.; Naret, C.; Bach, J. F. (Hopital Necker, 75015 Paris, France). *C. R. Acad. Sci. [D] (Paris)* 281(10):675-678; 1975.

Differences in the HL-A phenotypes of chronic uremic patients were investigated to determine their capacity to eliminate the hepatitis B antigen (HBsAg). Twenty-six histocompatibility antigens were studied (microlymphocytotoxicity and platelet complement fixation methods) in 328 chronic uremic patients who were treated by periodic hemodialysis; 201 were infected with the hepatitis B virus. HBsAg was detected at 2-3 month intervals by immunodiffusion, electroimmunodiffusion, passive hemagglutination, complement fixation, and radio-immunological tests. The only difference between patients with no HBs antigen (group 1, 127 patients), patients with persistent antigenemia (group 2, 154), and patients whose antigenemia disappeared after a few months (group 3, 47) was a significantly higher incidence of the phenotypes HL-A 1 (36.2%) and HL-A 8 (29.8%) in group 3 (HL-A 1,8, 23.4%) than in groups 1 and 2 (HL-A 1,8, 10.1 and 8.4%, resp.). The results suggest that an abnormally high frequency of the HL-A 1 and HL-A 8 association is characteristic of uremic patients who are capable of rapidly eliminating HBsAg.

3609 HISTOLOGICAL FEATURES OF CHOLESTASIS IN ACUTE AND CHRONIC HEPATITIS. (Fre.) Paliard, P.; Grimaud, J.-A. (Hopital E.-Herriot, Place Arsonval, F 69003 Lyon, France). *Arch. Fr. Mal. App. Dig.* 64(4):359-368; 1975.

The histological aspects of cholestasis in chronic and acute hepatitis are examined. Cholestasis is almost always present in acute common hepatitis, but it is moderate and has no particular characteristics; in pure or predominant acute cholestatic hepatitis, the cholestasis is more pronounced and constitutes the major lesion. In chronic hepatitis, cholestasis is inconsistent and is only accessory. The relations between cholestasis and alterations of the ductuli and septal canals are still hypothetical, since the changes are found in both cholestatic and noncholestatic forms; in addition, intralobular cholestatic lesions can be observed in both common acute hepatitis and acute cholestatic hepatitis. The only difference is the greater discretion of the cellular lesions in the latter form. It is suggested that the physiopathology of cholestasis is responsible for quantitative and qualitative alterations of the bile that are produced by hepatocytes involved in a pathological process originating from the cholestatic syndrome.

3610 BIOETHICAL QUESTIONS RELATED TO HEPATITIS B ANTIGEN. (Eng.) Blumberg, B. S. (Fox Chase Cancer Center, Philadelphia, PA 19111). *Am. J. Clin. Pathol.* 65(5):848-853; 1976.

Bioethical questions related to hepatitis B antigen carriers are discussed. The routine testing of blood donors for hepatitis B antigen (HBsAg) places carriers of hepatitis in a class different from that of other carriers (e.g., *Staphylococcus* and typhoid simply because they are identified). The bioethical problems, which derive from identification of such carriers, are viewed as a conflict between public health interests and individual liberty. The problems raised by person-to-person transmission are particularly difficult. The extent of hazards to the public is presently unclear, since it is not possible to distinguish carriers who transmit disease from those who do not. If all carriers are treated as infectious, the hazards imposed on them may be enormous (e.g., loss of job; inability to continue in the same profession, particularly the health sciences; restrictions on family and social contacts; etc.). It is suggested that the risk of transmitting hepatitis by person-to-person contact must be very small for a very large number of carriers. It is also suggested that until more is known about this situation all carriers should not be classed into the same stigmatized group.

3611 COMMON-SOURCE EPIDEMIC OF HEPATITIS DUE TO GLAZED AND ICED PASTRIES. (Eng.) Schoenbaum, S. C.; Baker, O.; Jezek, Z. (Dept. Medicine, Peter Bent Brigham Hosp., Boston, MA). *Am. J. Epidemiol.* 104(1):74-80; 1976.

Epidemiological studies that allowed the common source of a large outbreak of 61 cases of hepatitis to be identified and characterized are described. The highest attack rates were for persons 10-19 yr of age. The rate for boys was almost twice as high as for girls. Seventy percent of the cases involved school children, mainly from the public, as opposed to the parochial school, and most children were above grade 6. A virus was suspected and the dates of exposure were determined. The source was established as the local bakery where many public school children spent lunch breaks. Elementary school children and children attending the parochial school were not allowed to leave the school grounds at lunch time. Usually, there were twice as many boys as girls in the shop and they also ate twice as much. The source of infection was determined to be the icing or glaze on the baked products. The icing was spread on the baked goods by hand, and the doughnuts were hand dipped into the glaze; both processes occurred after all baking was completed. Whatever remained of the glaze or icing at the end of the day was stored for continued use and was mixed in with a fresh batch on the following day, thus allowing any contamination to remain active for a longer period. During the exposure period, the baker's assistant visited a physician, complaining of vomiting and a cold. He continued to work until a definite diagnosis of hepatitis was rendered. The source of the virus (feces, urine, blood, or saliva being the most likely) is not known. The data suggest that either certain persons or persons at certain stages of hepatitis may excrete a very large dose of virus concentrated in a very small amount of material.

3612 THE PREVALENCE OF HEPATITIS B SURFACE ANTIGEN IN COMMERCIALLY PREPARED PLASMA PRODUCTS. (Eng.) Hoofnagle, J. H.; Gerety, R. J.; Thiel, J.; Barker, L. F. (Bureau Biologics, Food Drug Admin., 8800 Rockville Pike, Bethesda, MD 20014). *J. Lab. Clin. Med.* 88(1):102-113; 1976.

Commercially available lots of plasma derivatives prepared between 1957 and 1975 were tested by radioimmunoassay for hepatitis B surface antigen (HBsAg). In all, 69% of lots of plasma protein fraction, 40% of factor IX concentrate, 20% of normal serum albumin, 13% of antihemophilic factor, 3% of fibrinogen, and 0.7% of immune serum globulin lots tested were HBsAg-positive. There was great variation in the prevalence of HBsAg-positive lots of each product among the different manufacturers, reflecting not only differences in methods of processing plasma, but also differences in donor populations. Those manufacturers relying upon volunteer donor plasma or placental source material demonstrated lower rates of HBsAg-positive lots of final products than those relying upon commercial donor plasma. There was a marked decrease in the prevalence of positive lots between 1971 and 1973, coincident with the onset of routine plasma donor screening for HBsAg. However, current requirements for plasma screening have not resulted in totally HBsAg-free plasma products. It is suggested that more sensitive and more reliable tests for HBsAg will probably reduce contamination of plasma pools with HBsAg to undetectable levels. However, despite HBsAg-status, the "high-risk" plasma products (fibrinogen, antihemophilic factor, and factor IX concentrate) must still be considered capable of transmitting hepatitis and must be used only with the strictest indication.

3613 AN ASSOCIATION OF HEPATITIS B (AUSTRALIA) ANTIGEN WITH PLATELETS. (Eng.) Furukawa, T.; Millman, I.; London, W. T. (Fox Chase Cancer Center, 7701 Burholme Ave., Philadelphia, PA). *Vox Sang.* 29(6):411-417; 1975.

Radioimmunoassay techniques were used to detect hepatitis B surface antigen (HBsAg) in individual cellular elements of blood from HBsAg carriers. HBsAg was not detected in erythrocytes, lymphocytes, or granulocytes. HBsAg was present in the platelet lysate, but not in the second and third platelet washes, suggesting that it was closely associated with platelets. HBsAg can become closely associated with platelets either through adsorption of particles to the cell membrane or by phagocytosis of the antigen. There are some data in support of the latter possibility. If platelets do phagocytize HBsAg particles, they may provide safety from immune attack for the infectious agent of hepatitis B and would thus allow the hepatitis B agent to travel from the point of entrance in the body to the liver or other organs. Studies of platelets incubated with fluorescine-labeled anti-HBsAg did not reveal significant staining of either surface or internal components. Electron microscopy did not reveal HBsAg-coated particles on the surface of the platelets. The results demonstrate an affinity between HBsAg and platelets, and suggest the possibility that HBsAg is phagocytized by the platelets. If the platelets do phagocytize HBsAg particles they might provide protection from immune attack for the infectious agent of hepatitis B and could be the means by which this agent travels from the point of entrance to other organs (e.g., liver) in the body.

3614 SERIAL LIVER BIOPSY OBSERVATIONS IN HEPATITIS B ANTIGEN CARRIERS BY LIGHT AND ELECTRON MICROSCOPY. (Eng.) Sun, S.-C.; Beasley, R. P.; Anderson, K. E.; Berg, H. S.; Hsu, C.-P.; Lee, W.-C. (Veterans General Hosp., U.S. Naval Medical Res. Unit No. 2, Taipei, Taiwan, Republic of China). *Am. J. Dig. Dis.* 21(5):366-369; 1976.

Liver morphology and function were restudied in 21 Chinese men with hepatitis B antigen (HBsAg) after an interval of 1.5-2 yr. Antigenemia and mild liver histopathology disappeared in one individual who developed antibody to HBsAg (anti-HBsAg). Twenty subjects who were chronic carriers of HBsAg had mild histological abnormalities that were usually persistent and were more commonly lobular than portal. Particularly striking were focal necrosis, eosinophilic bodies, ground-glass cytoplasmic change, and by electron microscopy, microtubular structures within cytoplasmic membranous cysternae. Interval development of chronic aggressive hepatitis was observed in only one subject. It is suggested that the great majority of HBsAg carriers have a good prognosis, at least over a 1.5-to 2-yr period, and that liver biopsy is most indicated in those patients with persistent liver function abnormalities.

3615 e ANTIGEN AND ANTI-e IN HBsAg CARRIERS. (Eng.) Feinman, S. V.; Berris, B.; Sinclair, J. C.; Wrobel, D. M.; Murphy, B. L.; Maynard, J. E. (Mt. Sinai Hosp., 600 University Ave., Toronto M5G 1X5, Ontario, Canada). *Lancet* 2(7946):1173-1174; 1975.

To assess the clinical significance of a new antigen/antibody system, "e" antigen and "anti-e," the presence of this antigen and antibody was correlated with the clinical status, SGPT levels, and liver histology of 70 hepatitis B surface antigen (HBsAg) carriers. Thirty-one carriers had liver biopsies. Thirty-two carriers had anti-e, and two had e antigen. Twenty-eight of 55 carriers with normal SGPT levels and 4 of 15 patients with raised SGPT had anti-e; this difference was not statistically significant. Two patients with e had raised SGPT levels. All patients with normal histology, 45% of patients with mild histological liver changes (i.e., lobular focal infiltrates with a very mild degree of infiltration in the portal tracts), and 23% of patients with striking histological liver changes (heavy portal infiltrates with additional lobular focal infiltrations) had anti-e; this association was statistically significant ($p<0.05$). The two patients with e antigen had the most severe abnormalities in liver function and histology. Since the patients with anti-e had been e-antigen positive at one point and subsequently seroconverted, it is likely that any predisposition to hepatic chronicity associated with e antigen must be related to long-term persistence of this determinant and not to short-term positivity. Indirect support for this assertion derives from the inverse relation found between frequency of anti-e and severity of liver dysfunction. A higher frequency of anti-e in patients with normal liver histology suggests that for those persisting hepatitis B infections in which the e determinant is measurable, anti-e seroconversion may predict the likelihood of a normal liver.

3616 DIAGNOSIS OF VIRUS B HEPATITIS. (Fre.) Lavillaureix, J. (Fasculte Medecine, Strasbourg, France). *J. Med. Strasbourg* 6(3):119-129; 1975.

3617 DIAGNOSTIC VALUE OF SERUM ARGININOSUCCINATE LYASE IN HEPATOBILIARY AFFECTIONS. (Ita.) Cagianelli, M. A.; Corsi, N.; Mutti, P. L. (Ospedale Generale Provinciale Pontedera Divisione Medicina Generale, Italy). *Fegato* 20(2):143-151; 1974.

3618 GEOGRAPHICAL DIFFERENCES IN THE ETIOLOGY OF CHRONIC HEPATOPATHIES IN ITALY. CASUISTIC COMPARISON BETWEEN NORTH AND SOUTH. (Ita.) Coltorti, M.; Calonghi, G.; Vigasio, T.; Saffiotti, O.; Del Vecchio-Blanco, C.; Radaeli, E.; Rinaldi, M.; Barra, P. (I Facolta di Medicina e Chirurgia dell Universota di Napoli, Italy). *Fegato* 20(1):61-72; 1974.

3619 VIRAL HEPATITIS TYPE B (I). (Dut.) Soeterboek, A. M. (Stichting Rode Kruis Bloedbank voor Eindhoven en omgeving, Eindhoven, Netherlands). *Pharm. Weekbl.* 110(18):361-370; 1975.

3620 IMMUNOLOGY OF VIRAL HEPATITIS. (Fre.) Hainaut, J. (Centre de Transfusion sanguine des Armees "Jean Julliard," 1, rue du Lieutenant Raoul-Batany, 92140 Clamart, France). *Prog. Med.* 103(7):215-219; 1975.

3621 IMMUNOGLOBULINS AND VIRAL HEPATITIS. (Ita.) Costantino, D.; Doglia, M.; Agosti, V.; Fabiani, M. P.; Godana, E.; Rossi, P. F.; Camusso, M. (Istuto di Clinica Medica II, Universita di Milano, Italy). *Gazz. Sanit.* 46(1/2):21-24; 1975.

3622 ACUTE HEPATITIS. (Dan.) Bille, H.; Mosbech, J. (Sundhedsstyrelsen, medicinal-statistisk afdeling, Denmark). *Ugeskr. Laeger* 137(51):3040-3041; 1975.

3623 HEPATITIS: EPIDEMIOLOGY 1974. (Ger.) Moeschlin, P.; Grob, P. J.; Joller-Jemelka, H. I. (Departement fur Innere Medizin, Kantonsspital, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 105(41):1307-1314; 1975.

3624 VIRAL HEPATITIS B (SERUM HEPATITIS): I. CLINICAL ASPECTS AND EPIDEMIOLOGY. (Dut.) Kater, L.; Borst-Eilers, E. (Academisch Ziekenhuis, Utrecht, Netherlands). *Ned. Tijdschr. Geneesk.* 119(34):1312-1319; 1975.

3625 HEPATITIS B VIRUS CULTURE TESTS ON HUMAN FETAL HEPATOCYTES. PRELIMINARY RESULTS. (Fre.) Maupas, Ph.; Darchis, J.-P.; Grenier, B. (Facultes de Medecine et de Pharmacie, 2 bis, boulevard Tonnelle, 37000 Tours, France). *C. R. Acad. Sci. [D] (Paris)* 282(1):127-129; 1976.

3626 VIRAL HEPATITIS IN PREGNANCY AND THE PUERPERIUM. (Fre.) Delecour, M.; Leroy, J. L.; Tacquet, A. (C.H.U. Lille, France). *Lille Med.* 19(10):1029-1030; 1974.

3627 STUDIES OF THE HISTORIES OF CHILDREN AND ADOLESCENTS AFTER VIRAL HEPATITIS. (Ger.) Sitzmann, F. C.; Berngruber, G. (Universitats-Kinderklinik Poliklinik, 8520 Erlangen, Loschgestrasse 15, Germany). *Therapiewoche* 22(23):3237-3238, 3240, 3243-3244, 3246; 1975.

3628 INTENSIVE THERAPY OF SEVERE FORMS OF VIRAL HEPATITIS. (Rus.) Sorinson, S. N.; Voronina, E. M.; Zhdakova, I. N.; Kolpashchikova, I. F.; Bobrova, G. V. (Gorki Medical Inst., Gorki, USSR). *Sov. Med.* (7):113-119; 1975.

3629 TREATMENT OF CHILDREN AT HEALTH RESORTS AFTER SEVERE VIRAL HEPATITIS. (Ukr.) Osipov, Iu. S.; Tumasova, E. A.; Koncharenko, G. N. (Pyatigorsk Scientific Res. Inst. Balneology and Physiotherapy, Pyatigorsk, USSR). *Pediatr. Akush. Ginekol.* 37(4):24-25; 1975.

3630 EFFECT OF CALCIUM OROTATE ON THE CLINICAL AND LABORATORY INDICES IN VIRAL HEPATITIS IN CHILDREN. (Ukr.) Bogatir'ova, S. O. (Kiev Medical Inst., Kiev, USSR). *Pediatr. Akush. Ginekol.* 37(4):22-24; 1975.

3631 SIGNIFICANCE OF HISTOLOGICAL FINDINGS FOR THE FINAL EXAMINATION OF PATIENTS WITH ACUTE VIRAL HEPATITIS AT THE END OF HOSPITAL TREATMENT. (Ger.) Metzner, C.; Kirsch, W.-D.; Haupt, R.; Arnoldt, K.-H. (Pathologischen Institut, Bezirkskrankenhauses, St. Georg Leipzig, Germany). *Z. Gesamte Inn. Med.* 30(14):467-471; 1975.

3632 ACUTE HEMOLYTIC ANEMIA CAUSED BY AUTO-ANTIBODIES. SEARCH FOR A POSITIVE Hb ANTIGEN [Letter to Editor]. (Fre.) Vachon, A.; Tuaillon, J.; Jean-Louis, Ph. (Hotel-Dieu, 1, place de l'Hopital, F 69288 Lyon Cedex 1, France). *Nouv. Presse Med.* 4(43):3072; 1975.

3633 GIANOTTI-CROSTI ACRODERMATITIS AND INFECTIOUS MONONUCLEOSIS, GIANOTTI-CROSTI ACRODERMATITIS AND HEPATITIS WITH THE AUSTRALIA ANTIGEN. (Fre.) Maleville, J.; Tamisier, J.-M; Delaunay, M.-M.; Boineau, D. (No affiliation given). *Bull. Soc. Fr. Dermatol. Syphiligr.* 82(3):229-281; 1975.

3634 GIANOTTI-CROSTI INFANTILE PAPULAR ACRODERMATITIS WITH POSITIVE AUSTRALIA ANTIGEN: EVOLUTION TOWARDS AN ACTIVE CHRONIC HEPATITIS [Letter to Editor]. (Fre.) Hermans, J.; Amiel, B.; Fourcaud, G. (Centre Hospitalier, F 34207 Sete, France). *Nouv. Presse Med.* 4(39):2807; 1975.

3635 MODERATE ERYTHROCYTOSIS IN THE INITIAL STAGE OF VIRAL HEPATITIS [Letter to Editor]. (Fre.) Capron, J. P.; Chivrac, D.; Lorriaux, A. (Centre Hospitalier Universitaire F 80030 Amiens Cedex, France). *Nouv. Presse Med.* 4(41):2951; 1975.

3636 VIRAL HEPATITIS AND BONE MARROW APLASIA. (Fre.) Gastard, J.; Leverger, J.-C.; Roudier, G.; Gosselin, M.; Boutin, J. (C.H.U. Pontchaillou, 35000 Rennes, France). *Sem. Hop. Paris* 51(22):1529-1531; 1975.

3637 POSTHEPATITIS HYPERBILIRUBINEMIA. (Spa.) Arzua; Bataller; Diaz-Rubio Garcia; Fernandez Pacheco; Ibarguen; Kutz; Molina Alonso; Sanchis Closa; Tortras. (No affiliation given). *Rev. Esp. Enferm. Apar. Dig.* 46(1):85-98; 1975.

3638 SEROLOGIC INVESTIGATION OF THE POSSIBLE ROLE OF MOSQUITOES IN THE SPREAD OF HEPATITIS B. (Gre.) Papaevangelou, G.; Kremastinou-Kourea, T. (Ech tou Ergasterion Ugieines chai Epidmiologias tes Iatriches Scholes tou Pan miou Athenon, Athens, Greece). *Iatriki* 26(1):49-54; 1974.

See also, 3556, 3561, 3576, 3791.

LIVER AND BILIARY TRACT

Chronic Hepatitis

3639 PREDNISONE FOR CHRONIC ACTIVE LIVER DISEASE: DOSE TITRATION, STANDARD DOSE, AND COMBINATION WITH AZATHIOPRINE COMPARED. (Eng.) Summerskill, W. H. J.; Korman, M. G.; Ammon, V. H.; Baggenstoss, A. H. (Mayo Clinic, Rochester, MN 55901). *Gut* 16(11):876-883; 1975.

The effects of prednisone (Pred), titrated by a standard mechanism, on the resolution of symptoms, abnormal liver function tests, and histological features of liver disease activity were investigated in 120 patients with chronic active liver disease (CALD). Patients who were treated with either maintenance doses of 20 mg Pred daily, with titrated doses given on alternate days (Pred-Titrad), or with a combination of 10 mg Pred and 50 mg azathioprine daily (Comb) survived, and their clinical and biochemical disease features were resolved more often than a control group receiving placebo or 100 mg azathioprine daily. The majority of patients treated with Pred or Comb entered full remission; remission occurred less often in the control group ($p<0.005$), and death occurred more frequently ($p<0.005$) than those receiving other therapies. In the Pred-Titrad patients, disappearance of histological features of active liver disease occurred less frequently ($p<0.005$) and remission was not more common than in the control group. The incidence of remission with Pred-Titrad was significantly and progressively less at each 6-month interval after 1 yr ($p<0.001$-0.005) through 36 months of follow-up. Histological remission occurred significantly more often with Pred and Comb than with other regimens (major side effects of therapy were commoner with Pred than with Comb or Pred-Titrad ($p<0.001$, for both). It is concluded that Comb is the initial treatment of choice for patients with CALD, since clinical, biochemical, and histological resolution of disease activity occurs as often as with Pred, while early side effects are significantly less frequent.

3640 FUNCTIONAL STATE OF THE MYOCARDIUM IN PATIENTS WITH CHRONIC HEPATITIS AND LIVER CIRRHOSIS UNDER ACUTE STROPHANTIN STIMULATION. (Rus.) Ol'binskaia, L. I.; Kitaeva, I. T.; Gorbatenko, V. P.; Ignatova, N. V. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Kardiologiia* 15(11):82-87; 1975.

See also, 3599, 3602, 3603, 3607, 3609, 3617, 3618, 3627, 3634, 3746.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

3641 ETHANOL METABOLISM IN LIVER CIRRHOSIS AND CHRONIC ALCOHOLISM. (Eng.) da Cruz, A. G.; Correia, J. P.; Menezes, L. (Hospital Escolar Sta.-Maria, Lissabon 4/Portugal). *Acta Hepato-gastroenterol.* 22(6):369-374; 1975.

Ethanol metabolism and its influence on the serum lactate/pyruvate ratio was studied in 17 patients. Ethanol (0.75 g) was injected i.v. in four controls, five alcoholics with cirrhosis, four non-alcoholic cirrhotics, and four alcoholics without liver disease. All refrained from the use of alcohol and drugs 4 weeks prior to the experiment. After maximal ethanol blood levels were achieved at the end of the infusion, ethanol removal occurred at two different rates. This was probably due to the fact that different volumes of ethanol were distributed with time: a fast period (30-60 min) and a slow period (60-180 min). The rates of disappearance in the two periods were similar in all groups, suggesting that liver cirrhosis, independent of clinical severity and/or chronic alcoholism with previous abstinence from alcohol, does not modify ethanol metabolic rates in the liver. The relation of lactate/pyruvate doubled in all cases, but it occurred within 30 min in the groups without liver disease and within 60 min in the cirrhotics. It is suggested that this accounts for the decreased occurrence of alcohol hypoglycemia found in cirrhotic patients.

3642 THE CLINICAL VALUE OF ASCITIC FLUID CULTURE AND LEUKOCYTE COUNT STUDIES IN ALCOHOLIC CIRRHOSIS. (Eng.) Kline, M. M.; McCallum, R. W.; Guth, P. H. (Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 70(3):408-412; 1976.

A prospective study of peritoneal fluid culture and WBC findings was undertaken in 63 male patients with alcoholic cirrhosis and ascites to establish an acceptable leukocyte count in sterile ascites. The average total ascitic WBC count in sterile ascites was 404 cells/mm^3, with a range of 28-1800; 50% of the patients had greater than 300 WBC/mm^3. The mean percentage of polymorphonuclear (PMN) leukocytes was 43%, with a range of 2-98% and 53% were in excess of 25%. Five patients with spontaneous bacterial peritonitis (SBP), proven by positive cultures, had an ascitic SBP count range of 300-6320 WBC/mm^3 and a PMN leukocyte range of 20-76%. Physical findings did not allow clear separation of the two groups. Anaerobic organisms were not found. The majority of the patients had advanced alcoholic liver disease and were often severely ill as evidenced by an in-hospital mortality of 17%. The severity of illness, as characterized by fever, abdominal pain, hepatic tenderness, encephalopathy, and mortality, was not correlated with an increased ascitic WBC count. It is concluded that the differentiation of SBP from sterile ascites relies on prompt ascitic fluid bacteriology and that the increased survival rate of 40% of SBP patients in this study may be related to increased awareness of the problem and to early treatment.

3643 ALCOHOLIC HEPATITIS SUPERIMPOSED ON CIRRHOSIS. CLINICAL SIGNIFICANCE AND EFFECT OF LONG-TERM PREDNISONE TREATMENT. (Eng.) Schlichting, P.; Juhl, E.; Poulsen, H.; Winkel, P.; et al. (Kommunehospitalet, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(3):305-312; 1976.

The effect of long term prednisone treatment of patients with biopsy-verified alcoholic hepatitis superimposed on cirrhosis was investigated to determine the correlation between the morphological and clinical syndrome of alcoholic hepatitis. Of 483 patients with biopsy-verified cirrhosis, 99 had alcoholic hepatitis as defined by morphological criteria in the initial biopsy. Prednisone was given in an initial dose of 40 mg/day followed after 1-2 months by a maintenance dose of 10-15 mg/day. The maximum period of observation, per patient, ranged from 5-12 yr. In a comparison of clinical, biochemical, serological, and morphological features, male sex ($p<0.01$), alcoholism ($p<0.01$), vascular spiders ($p<0.05$), parotid enlargement ($p<0.05$), and white finger nails ($p<0.05$) predominated in patients with alcoholic hepatitis, whereas the frequency of patients with positive ANA and AGCT was higher among patients without alcoholic hepatitis. These differences disappeared when the comparison was confined to patients with admitted alcoholism. Daily consumption of alcohol was found in 82 of the 99 patients with morphological alcoholic hepatitis, 63 patients having a daily consumption of more than 50 g ethanol and 19 patients consuming less than 50 g daily. The survival of prednisone treated patients (median survival time 38 months), placebo treated patients (median survival time 34 months), and alcoholic hepatitis patients did not differ significantly. This was also true for each of the two subgroups comprising mild and severe cases, resp. It is concluded that in the majority of patients with morphologically diagnosed alcoholic hepatitis, prednisone treatment does not have any significant effect on survival.

3644 STUDIES ON THE SERUM LIPID AND LIPOPROTEINS IN STEATOSIS OF THE LIVER. (Eng.) Hilden, M.; Clausen, J. (Bispebjerg Hosp., Copenhagen, Denmark). *Acta Med. Scand.* 198(3):207-212; 1975.

Forty-five patients (33 men and 12 women) with steatosis of the liver were examined for serum lipid abnormalities. Twenty-eight patients were chronic alcoholics. Annual check-ups, including liver biopsy, were made to evaluate the development of the steatosis. The patients did not receive treatment with drugs or diet. Thirteen patients showed hypercholesterolemia, 16 increased serum triglyceride, and 8 increased serum phosphorus lipid. Two showed a type I lipoprotein anomaly, and 33 a type H-like pattern (increased β-lipoprotein, but normal serum cholesterol). Type II lipoprotein anomaly (increased β-lipoprotein associated with increase of serum cholesterol was found in four cases. Three had a type III and three had a type IV abnormal pattern, with increased pre-β-lipoprotein and serum triglyceride levels. There was a linear relation between the serum triglyceride levels and the percentage of the pre-β-lipoprotein ($p \leq 0.001$) and between serum triglyceride levels and serum free fatty acid levels ($r=0.95$). The slope of this regression line differed significantly from zero ($p \leq 0.001$). However, the slope of the regression line, showing the serum free fatty acid level as a function of the percentage of the pre-β-lipoprotein, was also significantly different from zero ($p \leq 0.001$) but the correlation coefficient was only $\overline{0}.69$. It is concluded that in cases where hepatic steatosis is related to alcoholism, a correlation exists between high serum free fatty acids, serum triglycerides, and to some extent, serum pre-β-lipoproteins. Although alcohol is known to stimulate triglyceride synthesis, alcoholism associated with steatosis hepatis is not associated with Frederickson lipoprotein type IV abnormality.

3645 EXPERIMENTAL AND CLINICAL STUDY ON FATTY ELIMINATION OF COENZYME A OF THE FATTY LIVER. (Ger.) Ohmori, S.; Hirayama, Y.; Iwamura, K. (Medizinische Klinik, Tokai Universitat, 259-11 Isehara, Bohseidai, Kanagawa, Japan). *Keio J. Med.* 24(3):219-240; 1975.

3646 EVALUATION OF 18 CASES OF ALCOHOLIC FATTY DEGENERATION OF THE LIVER TREATED WITH ALPHA-MERCAPTOPROPIONYLGLYCINE AND STUDIED WITH HEPATIC BIOPSY BEFORE AND AFTER TREATMENT. (Ita.) Di Silverio, C. (Ospedale Civile di Sanremo, Divisione di Medicina, Italy). *Policlinico Sez. Med.* 81(6):460-472; 1974.

3647 EXPERIENCE WITH ZIEVE'S SYNDROME AT A HEPATITIS WARD. (Ger.) Falkenhagen, D.; Lafrenz, M.; Kaben, H.; Ziegler, K. (Klinik fur Innere Medizin der Universitat Rostock, 25 Rostock 1, Ernst-Heydemann-Strasse, E. Germany). *Dtsch. Gesundheitswes.* 31(4):181-184; 1976.

See also, 3156, 3158, 3246, 3528.

Cirrhosis

3648 CLASSIFICATION OF CIRRHOSIS. (Eng.) Galambos, J. T. (69 Butler St., S.E., Atlanta, GA 30303). *Am. J. Gastroenterol.* 64(6): 437-451; 1975.

The new classification of cirrhosis based on concepts of the pathology, pathogenesis, and clinical manifestations of the disease is presented. Cirrhosis was classified in 1974 according to morphologic and etiologic criteria. Morphologic classification includes micronodular cirrhosis, macronodular cirrhosis, and incomplete septal (multilobular) cirrhosis. The etiologic classification includes: cirrhosis of genetic disorders such as galactosemia, glycogen storage disease, tyrosinosis, hereditary fructose intolerance, alpha$_1$-antitrypsin deficiency, thalassemia, Wilson's disease, iron overload, incomplete biliary cirrhosis following cystic fibrosis, hereditary hemorrhagic telangiectasia, and abeltalipoproteinemia; chemical cirrhosis following predictable or nonpredictable toxic injury; alcoholic cirrhosis; infectious cirrhosis such as cirrhosis of viral hepatitis, congenital syphilis, and parasitic infections; nutritional cirrhosis after intestinal bypass operation for obesity; secondary biliary cirrhosis; congestive cirrhosis; cryptogenic cirrhosis; primary biliary cirrhosis; Indian childhood cirrhosis; and sarcoid cirrhosis. The authors conclude that this new classification scheme improves the understanding of the clinical-pathological correlations associated with various subgroups of human cirrhosis.

3649 CHANGES OF FREE AND TOTAL THYROXINE IN PATIENTS WITH LIVER CIRRHOSIS. (Pol.) Gembicki, M.; Dzieciuchowicz, S.; Sowinski, J.; Makowska, K.; Klincewicz, H. (60-355 Poznan, ul. Przybyszewskiego 49, Klinika Endokfrynologii, Poland). *Pol. Arch. Med. Wewn.* 54(2):141-146; 1975.

Total thyroxine concentration in serum (T_4), triiodothyronine-binding index (T_3I), free thyroxine by the dialysis method (DFT_4), free thyroxine index (FT_4I), and absolute value of free thyroxine ($ADFT_4$) were determined in 11 patients with compensated liver cirrhosis and in 10 patients with uncompensated cirrhosis. Statistically significant increases in T_3I, DFT_4, $ADFT_4$, and FT_4I were observed only in the uncompensated cirrhotics. It is concluded that these changes develop not as a result of excessive production of thyroid hormones but as a result of disturbances in the binding capacity of proteins that bind thyroid hormones, and as a result of impaired degradation of these hormones.

3650 CONCENTRATIONS OF AMINO ACIDS IN THE BLOOD OF DIFFERENT VESSELS OF PATIENTS WITH CIRRHOSIS OF THE LIVER DURING AND AFTER THE INTRODUCTION OF A PORTACAVAL ANASTOMOSIS. (Ger.) Breuer, J.; Breuer, H. (Institut fur Klinische Biochemie der Universitat Bonn, 5300 Bonn-Venusberg, W. Germany). *Z. Klin. Chem. Klin. Biochem.* 13(5):191-196; 1975.

Amino acid concentrations were measured by ion exchange chromatography in serum taken from various vessels during and after the performance of a portocaval anastomosis in patients with liver cirrhosis. In three female and eight male patients, amino acids were determined during surgery in samples taken from the following vessels (n=number of blood samples): arm vein (n=8), arteria femoralis (n=2), vena cava (n=7), vena portae (n=9), and aorta abdominalis (n=5). With exception of ornithine (aorta abdominalis versus vena cava), no statistically significant differences in the concentrations of amino acids were observed in the various blood vessels. One to three yr after the introduction of the portocaval shunt, amino acid concentrations were measured in blood from the arm vein and arteria femoralis in four female and five male patients. The concentrations of glutamic acid, phenylalanine, and lysine were significantly higher in blood from the arm vein than in blood from the arteria femoralis. The concentration of valine, leucine, and isoleucine were markedly lower in patients with liver cirrhosis than in normal subjects. It is concluded that portacaval anastomosis does not exert a noticeable effect on the metabolism of amino acids in patients with liver cirrhosis.

3651 USE OF A MILK AND CHEESE DIET IN TREATMENT OF ENCEPHALOPATHIES AS A RESULT OF PORTACAVAL SHUNT SURGERY AND CIRRHOSIS. (Fre.) Paccalin, J.; Cubanel, M.; Lantuit, P.; Traissac, F. J. (Hopital Saint-Andre, F-33000 Bordeaux, France). *Z. Ernaehrungswiss.* 14(2):113-124; 1975.

The effect of a 2,500-calories/day diet, which excluded protein from sources other than milk, cheese or vegetables, was studied in 38 alcoholic patients. Of the 38 patients, 11 had portacaval shunts, 6 were anorectic and hypertensive, and 21 had encephalopathic symptoms related to the cirrhosis (E.P.C.). The central nervous system (CNS) symptoms included alterations in sleep patterns, mood and character changes through confusion and disorientation to agitation, and a precoma state. Ammoniemia was usually present; however, there was little correlation between serum ammonia levels and clinical signs. Respiratory alkalosis, with pH above 7.45, was a symptom in the E.P.C. cases. The diet had a beneficial effect, and CNS symptoms disappeared within 17 days in the 11 cases with portacaval shunts and in 16 of 21 cases with E.P.C. The diet had a variable effect on the cirrhosis, but in some cases appetite returned, ascites receded, and hemorrhagic syndrome improved. Improvement of cirrhosis did not necessarily correlate with regression of encephalopathy or decrease in blood ammonia levels. It is concluded that diet be followed and in cases of cirrhosis, with and without E.P.C., and E.P.C., resulting from portacaval shunt surgery.

3652 PORTOSYSTEMIC SHUNTING IN PATIENTS WITH PRIMARY BILIARY CIRRHOSIS: A GOOD RISK DISEASE. (Eng.) Bauer, J. J.; Gelernt, I. M.; Kreel, I. (Mount Sinai Hosp., 100th St. and 5th Ave., New York, NY 10029). *Ann. Surg.* 183(3):324-328; 1976.

The results of portosystemic shunting procedures in five patients with primary biliary cirrhosis were compared with the results of 45 shunts performed in 42 patients with other types of cirrhosis (Laennec's, post-necrotic, schistosomal, biliary, or sarcoid). The case reports of the five patients with primary biliary cirrhosis are presented. Three of the five procedures performed for variceal bleeding were emergencies, and two were elective. There was no operative mortality; all patients were followed until the present or until death. One patient is alive 4 yr and another is alive 2 yr postoperatively. One patient died 4 yr after operation, and another died 16 months postoperatively. Another patient survived for 8 yr following her shunt and eventually died as a result of a cerebrovascular accident. The larger group of patients underwent portosystemic shunting because of portal hypertension secondary to other forms of liver disease. The operative mortality for the 20 shunt procedures performed on patients with Laennec's cirrhosis was 30%, while it was 10% in 20 procedures on patients with post-necrotic cirrhosis. There was no operative mortality in the five remaining patients with one of the three other types of cirrhosis. The absence of operative mortality in the patients with primary biliary cirrhosis and the fact that several of these patients had moderately long postoperative survival despite apparently poor liver function suggest that the usual criteria for assessing operative risk are not valid in primary biliary cirrhosis.

3653 "DISEASE" OR "SYNDROME" OF CRUVELHIER-BAUMGARTEN? (Ita.) Coraggio, F.; Caprio, N. (I Facolta di Medicina e Chirurgia, Universita di Napoli, Naples, Italy). *Riforma Med.* 89(11):467-484; 1975.

3654 CRUVEILHIER-BAUMGARTEN'S SYNDROME. (Rus.) Patsiora, M. D.; Ershov, Iu. A.; Danil'iants, E. V.; Kharazov, F. V. (All-Union Scientific Res., Inst. Clinical and Experimental Surgery, USSR). *Klin. Med. (Mosk.)* 53(11):83-88; 1975.

3655 EPIDEMIOLOGY OF LIVER CIRRHOSIS AMONG THE POPULATION OF THE ISSSTE. SAL. PUBL. MEX. (Spa.) Aceves Sainos, D.; Garcia Romero, H.; Valladares Sosa y Col, O. (Departamento de Medicina Preventiva y Social, ISSSTE, Mexico). *Salud. Publ. Mex.* 17(4):453-458; 1975.

3656 NEONATAL HEPATITIS WITH ALPHA-1-ANTITRYPSIN DEFICIT. ABOUT A PERSONAL CASE. (Fre.) Michiels, R.; Cabanne, F.; Nivelon, J. L.; Justrabo, E.; Bastien, H.; Knopf, J. F.; Bordes, M.; Izac, M. (Faculte de Medecine, 7, boulevard Jeanne d'Arc, 21000 Dijon, France). *Ann. Anat. Pathol.* 20(2):159-176; 1975.

3657 UMBILICAL CATHETERIZATION AND PORTAL HYPERTENSION. (Fre.) Delgado, A.; Lozano, M. J. (Faculdad de Medicina, Universidad de Navarra, Pamplona, Spain). *Med. Chir. Dig.* 3(4):289-292; 1974.

3658 PHLEBOGRAPHIC STUDY AND PATENCY ASSESSMENT OF CAVAL-MESENTERIC BY-PASSES FOR PORTAL HYPERTENSION. (Fre.) Auvert, J.; Weisgerber, G. (Hopital Henri-Mondor, 74, av. du Marechal de Lattede-Tassigny, 94010 Creteil, France). *Ann. Chir.* 29(8):701-706; 1975.

3659 ESSENTIAL CHOLINE PHOSPHOLIPIDS--AN EFFECTIVE AND EXPEDIENT MEANS OF HEPATIC CIRRHOSIS TREATMENT. (Cze.) Fassati, P.; Fassati, M. (Oddeleni klinicke biochemie, OUNZ, 190 61 Prague 9, Sokolovska 304, Czechoslovakia). *Cas. Lek. Cesk.* 114(40):1243-1250; 1975.

3660 METABOLIC CONSEQUENCES OF RAPID I.V. ADMINISTRATION OF FRUCTOSE IN CIRRHOTICS AND HEALTHY SUBJECTS. (Cze.) Brodanova, M.; Filip, J.; Brodan, V. (Fakulta vseobecneho lekarstvi University Karlovy, 128 08 Prague 2, U nemocnice 2, Czechoslovakia). *Cas. Lek. Cesk.* 114(34/35):1044-1050; 1975.

3661 SURGICAL TREATMENT OF LIVER CIRRHOSIS WITH THE USE OF REGENERATION STIMULATORS. (Rus.) Akhundzhanov, B. A. (Central Asian Medical Inst. of Pediatrics, Tashkent, USSR). *Khirurgiia* (1):34-38; 1976.

3662 ON THE PATHOGENESIS OF THE PORTAL HYPERTENSION SYNDROME IN CHILDREN. (Rus.) Akopian, V. G.; Shvedova, L. P. (I. V. Rusakov Municipal Children's Hosp. No. 2, Moscow, USSR). *Khirurgiia* (1):38-45; 1976.

3663 ON THE PATHOGENESIS OF ASCITES IN LIVER CIRRHOSIS. (Rus.) Sarnatskii, V. M. (Khmelnitski Oblast Hosp., Khmelnitski, USSR). *Vrach. Delo* (1):49-52; 1976.

3664 SPONTANEOUS RUPTURE OF THE URINARY BLADDER IN A CIRRHOTIC PATIENT. (Rum.) Turcu, N.; Oancea, N.; Laky, D. (Spitalul "Dr. St. Stinca," Bucharest, Rumania). *Chirurgia (Bucur.)* 25(1):63-64; 1976.

See also, 3284, 3546, 3550, 3556, 3576, 3618, 3627, 3640, 3641, 3643, 3728.

Gallbladder and Biliary Tract Diseases

3665 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY: PROBLEMS IN INTERPRETATION. (Eng.)

Kittredge, R. D.; Baer, J. W. (St. Luke's Hosp., 421 West 113th St., New York, NY 10025). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(1):35-46; 1975.

Problems in interpreting percutaneous transhepatic cholangiography are reviewed in 10 patients presenting with jaundice. Diagnoses included carcinoma of the head of the pancreas (2), choledocholithiasis (2), and one case each of carcinoma of the ampulla of Vater, multifocal sclerosing fibrosis, carcinoma of the gallbladder, diffuse adenocarcinoma of the liver, carcinoid of the duodenum involving the ampulla, and a granular cell myoblastoma obstructing the cystic duct and partially obstructing the common duct. Liver function tests revealed elevated levels of bilirubin, alkaline phosphatase, amylase, LDH, and SGOT. In some cases, the inability of the contrast material to filter through dense inspissated bile down to the true site of the block caused problems. In such cases, extensive aspiration is suggested. In diagnosing choledocholithiases, the picture appears either as defects due to the actual stones or as areas of narrowing secondary to trauma to the ductal system. Single or multiple localized narrowings of the biliary system may be caused by various diseases. Gastrointestinal series should always precede a percutaneous transhepatic cholangiogram, as biliary disease is often secondary to primary gastrointestinal pathology. Benign tumor of the common duct, inflammatory disease, secondary effects of calculi in the biliary tree, and multifocal fibrosclerosis must all be considered in the differential diagnosis of what may appear as a relatively benign, smooth, narrowed area of the biliary system. Failure to visualize the biliary tree by puncture is viewed as a technical failure from which no reliable information or assumptions may be drawn. In identifying the site of the block, additional procedures may be helpful, particularly selective visceral angiography. Percutaneous transhepatic cholangiography is the single examination capable of preventing unnecessary exploration of a jaundiced patient with primary liver parenchymal disease, and it is the most useful source of information if laparotomy becomes necessary to correct biliary tract obstruction.

3666 EVALUATION OF PEROPERATIVE CHOLANGIOGRAPHY DURING CHOLECYSTECTOMY. (Eng.)

Zimmermann-Nielsen, C.; Dyreborg, U.; Madsen, C. M. (Odense Univ. Hosp., Odense, Denmark). *Acta Chir. Scand.* 141(6):526-531; 1975.

The indications for exploration of the common duct, and the diagnostic reliability of postexplorative cholangiography were evaluated in a retrospective investigation comprising 219 choledochotomies, of which 57 were explorative and 162 were choledocholithotomies. Explorative choledochotomy was justified in 40 out of 57 cases, unless the risk of overlooking stones in the bile ducts was to be increased. In the remainder of the cases it was a question of either misinterpretation or of nonevaluable cholangiograms. A diagnostic reliability of 93.6% was obtained in postexplorative cholangiography, making the incidence of residual stones at postoperative cholangiography 6.4%. The errors were due to either technically poor cholangiograms (4/14) or misinterpretations (10/14). Peroperative cholangiography is a most important aid in diagnosing stones in the bile ducts before as well after choledochotomy, but the results can presumably be improved by radiological expertise.

3667 GRAY SCALE ULTRASOUND DIAGNOSIS OF OBSTRUCTIVE BILIARY DISEASE. (Eng.)

Stone, L. B.; Ferrucci, J. T., Jr.; Warshaw, A. L.; Wittenberg, J.; Slutsky, M. (Massachusetts General Hosp., Boston, MA 02114). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(1):47-50; 1975.

The diagnosis of obstructive ectasia of intra- and extrahepatic biliary ducts by gray scale ultrasound technique is described in two patients. In the first patient ultrasound examination was performed to exclude associated pancreatic abnormality. It revealed a dilated common duct containing a large calculus. Intravenous cholangiography disclosed a 1 cm common duct stone. Ultrasound examination disclosed a distinct 3.5 cm cystic structure with sharply defined margins located in the hepatic parenchyma. The round transonic space, having the appearance of a dilated duct in cross-section, appeared more laterally placed than the usually observed gallbladder echo. In the second patient, an abdominal ultrasound examination indicated a large irregular solid mass in the head of the pancreas. In addition, well-defined small ductal structures were seen to occupy a significant portion of the right liver lobe. Obstructive jaundice and cholangitis secondary to carcinoma of the pancreas was diagnosed. This case clearly indicates that the degree of intrahepatic biliary ectasia does not have to be as extensive as noted in the prior example of a dilated common duct. Multiple small intrahepatic ducts were defined, ranging in size from 0.75 to 1.0 cm. It is concluded that solid and fluid filled intrahepatic structures can be clearly discriminated by gray scale ultrasound technique.

3668 THE SIGNIFICANCE OF LIPOPROTEIN X IN THE DIAGNOSIS OF OBSTRUCTIVE JAUNDICE: COMPARISON WITH OTHER BIOCHEMICAL TESTS. (Ger.)

Mayr, K. (Allgemeines Krankenhaus Wels/Osterreich, Zentrallaboratorium, A-4600 Wels, Grieskirchnerstr. 42, Austria). *Dtsch. Med. Wochenschr.* 100(43):2193-2197; 1975.

The reliability of lipoprotein X demonstration in the diagnosis of obstructive jaundice was tested in 660 patients (1,105 samples) and compared with other biochemical parameters. Groups of 100 patients, each with morphologically proven liver or biliary-tract disease, were analyzed to determine the frequency with which the lipoprotein X demonstration and biliary stasis coincided. No direct connection between hepatitis B antigen and lipoprotein X was shown. Total cholesterol concentration proved to be of no use in the differential diagnosis of jaundice, although in a series of cases with and without obstruction, the mean concentrations differed significantly. Intra- and extrahepatic causes of jaundice and their etiology could not be clarified merely by demonstrating the presence or absence of lipoprotein X. However, it was shown to be a simple and safe method for proving biliary stasis.

3669 CLINICAL MANAGEMENT OF ACUTE CHOLANGITIS.

(Eng.) Saharia, P. C.; Cameron, J. L. (Johns Hopkins Medical Inst., Baltimore, MD). *Surg. Gynecol. Obstet.* 142(3):369-372; 1976.

The treatment of 78 patients hospitalized for acute cholangitis was evaluated by determining predisposing factors, clinical symptoms, hospital course, bacteriologic findings, and clinical outcome. Forty-eight of these patients had common duct stones, and in one-third of these, the stones were considered to be primary common duct stones. Serum bilirubin levels were elevated more than 5 mg% in 41 patients, while in 30, the levels ranged from 1 to 5 mg%. Alkaline phosphatase levels were elevated in 66 of 72 patients. SGOT levels were normal in only 3 of 45 patients, between 20-100 units in 29 patients, and over 100 units in 13 patients. SGPT values were normal in 1 of 35 patients, between 20-100 units in 23 patients, and over 100 units in 11 patients. Serum amylase levels were elevated in 19 of 54 patients; in 6 patients, the amylase value was more than 1,000 Caraway units. Roentgenograms of the abdomen, taken in flat and upright positions, were normal in 44 of 52 patients. An intravenous cholangiogram was performed in 38 patients and it demonstrated a pathologic condition in the biliary tree in only 15, while the remaining 23 patients did not visualize the biliary tree. In 20 of 50 patients from whom blood cultures were obtained, the culture was positive. *Escherichia coli* and *Klebsiella* were the two most common organisms, being isolated in 17 cases. All the patients were treated with combinations of antibiotics. Aminoglycoside and penicillin are an appropriate combination. Laparotomy was not carried out for several days after admission in several cases. Eleven patients died, six of them from continuing or recurring sepsis; postmortem examination revealed a retained stone or an inadequately treated stricture. It is concluded that adequate diagnostic procedures (i.v. cholangiography, transhepatic cholangiography, or transduodenal cholangiography) are necessary prior to exploration.

3670 THE URGENCY OF DIAGNOSIS AND SURGICAL TREATMENT OF ACUTE SUPPURATIVE CHOLANGITIS.

(Eng.) Welch, J. P.; Donaldson, G. A. (Box 87-H, Womack Army Hosp., Fort Bragg, NC 28307). *Am. J. Surg.* 13(5):527-532; 1976.

A follow-up study (average 5.5 yr) of 20 patients with suppurative cholangitis, who were treated at the Massachusetts General Hospital between 1962-1970, was conducted to determine the course and outcome of the disease. Fifteen patients had acute obstructive suppurative cholangitis due to complete obstruction of the common duct, many with coma, hypotension, and positive blood cultures. A total of 60% were older than 70 yr and most had a history of biliary tract disease. Although most had jaundice, abdominal pain, and fever, clinical symptoms were variable. The diagnosis of cholangitis was made in only 30% of patients before autopsy or surgery. Eighteen patients had calculi in the common duct, and two had primary fibrosis of the ampulla. Fewer of the patients with acute obstructive suppurative cholangitis operated on less than 24 hr after admission or deterioration died (17%) than those operated on after some delay (67%). Most patients underwent common duct exploration, and four had a concomitant sphincterotomy. In one instance, cholecystostomy only was performed, and this patient died because of ongoing sepsis. The overall mortality was 40%; of those subjected to operation, 25% died in the hospital. Most deaths occurred in seriously ill patients in whom surgical exploration was delayed from 48-72 hr. Recovery was dramatic in the 12 surviving patients, and calculous disease did not recur, except in two patients with retained stones. Prophylactic cholecystectomy is recommended to prevent the occurrence of this subtle and highly dangerous syndrome.

3671 IDEAL CHOLECYSTECTOMY: IN AN EARLY STAGE AT AN EARLY AGE.

(Eng.) van der Linden, W.; Sunzel, H. (Dept. Surgery, Centrallasarettet, Ostersund and Lasarette, Varberg, Sweden). *Acta Chir. Scand.* 142(1):62-66; 1976.

Two consecutive series of patients operated on for gallstone disease were compared to determine the effect of therapeutical approach on disease characteristics. One series (A) was from a hospital with an active surgical policy, while the other (C) was from a hospital with a conservative attitude about surgery. When subjected to the X^2 test, the conservative hospital had more cases of jaundice ($p>0.01$), more patients with high fever (equal to or greater than 39°), more patients with common duct and hepatic duct stones ($p<0.01$), more patients with hepatic duct stones ($p<0.01$), more cases of protracted fever ($0.05>p>0.01$), more cases of postoperative complications ($p<0.01$), and longer hospital stays. The older patients (over 60 yr) had a large influence on test results. Although hospital A serves an older population, it is concluded that gallstone patients in the area are operated on at an earlier age. It is also concluded that the ideal treatment for gallstone disease is early operation, i.e., operation at an early stage and at an early age.

3672 DAILY FLUCTUATION OF LITHOGENICITY IN BILE IN THE POSTOPERATIVE PERIOD IN CHOLECYSTECTOMIZED PATIENTS.

(Eng.) Massarrat, S.; Kumpel, W. (Medizinische Universitats-Poliklinik D-3550 Marburg/Lahn, W. Germany). *Res. Exp. Med.* 166(3):201-207; 1975.

The fluctuation of lithogenicity in bile samples taken at 4-to 5-hr intervals over 14 hr (7 AM to 9 PM) on 2 consecutive days was measured in seven freshly cholecystectomized patients on the 7th-9th days postoperatively. In four of the patients, the effect of meal intake on bile composition was studied in samples taken 1 and 2 hr after lunch. Daily fluctuations were observed. Lithogenicity in the bile started to increase 2 hr after lunch and peaked at 16 hr with a lithogenic index of 1.54, a high value compared with values in bile taken before breakfast (1.03) and lunch (0.90). These findings were different from those reported by other workers in earlier studies. The difference in study populations may account for the different findings. The fact that one patient lost bile through the T-tube in the first days after surgery and that five patients had gallstones in the main bile ducts may have influenced the type of diurnal fluctuations even though the enterohepatic circulation in these patients was largely intact 1 day before and during the study. Whatever the cause of this daily fluctuation of lithogenicity, it must be taken into consideration.

3673 EFFECTS OF ORAL CONTRACEPTIVES ON THE GALLBLADDER BILE OF NORMAL WOMEN. (Eng.) Bennion, L. J.; Ginsberg, R. L.; Garnick, M. B.; Bennett, P. H. (Natl. Inst. Arthritis, Metabolism, and Digestive Diseases, 4212 N. 16th St., Phoenix, AZ 85016). *N. Engl. J. Med.* 294(4):189-192; 1976.

The effects of contraceptive steroids on the lipid composition of gallbladder bile were studied in 22 healthy women. Each subject was studied during routine use of oral contraceptives and also during normal menstrual cycles on no medication. Gallbladder bile was significantly more saturated with cholesterol during contraceptive therapy than during normal menstrual cycling (125% versus 92%, $p<0.001$). Chenodeoxycholic acid accounted for a significantly smaller proportion (35% versus 42%, $p<0.001$) and cholic acid a significantly greater r proportion (50% versus 41%, $p<0.001$) of total bile acids during contraceptive steroid therapy. These findings indicate that exogenous sex steroids in doses and formulations routinely prescribed induce important alterations in the composition of human gallbladder bile, and suggest a biochemical basis for the increase in gallbladder disease observed among women using oral contraceptives.

3674 THE SECRETION AND COMPOSITION OF LIVER BILE. (Pol.) Kuska, J. (Instytut Chorob Wewnetrznych Slaskiej Akademii Medycznej, 40-027 Katowice, Francuska 20, Poland). *Postepy Hig. Med. Dosw.* 29(4):515-536; 1975.

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3676 LITHOGENIC BILE. (Dut.) Standaert, L. O. (Ziekenhuis St. Elisabeth, Antwerp, Belgium). *Tijdschr. Gastroenterol.* 18(3):174-189; 1975.

3677 PATHOPHYSIOLOGY OF BILIARY PAIN. (Ita.) Procacci, P.; Zoppi, M.; Maresca, M. (Cattedra di Terapia medica sistematica, Universita degli Studi, Florence, Italy). *Recent. Prog. Med. (Roma)* 59(1):28-40; 1975.

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3690 1,272 OPERATIONS FOR COMMON BILE DUCT CALCULI: IV. INDICATIONS AND LIMITS OF TRANSDUODENAL APPROACH TO COMMON BILE DUCT CALCULI. (Fre.) Mallet-Guy, P. (No affiliation given). *Lyon Chir.* 71(6):399-412; 1975.

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3728 PLACE OF AMMONIA INTOXICATION IN THE PATHOGENESIS OF POSTOPERATIVE HEPATIC INSUFFICIENCY IN OBSTRUCTIVE JAUNDICE. (Rus.) Krakovskii, A. I.; Piskunov, V. P. (Kemerovo Medical Inst., Kemerovo, USSR). *Khirurgiia* (1):19-24; 1976.

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3733 RESIDUAL STONES IN THE EXTERNAL BILIARY TRACT: THEIR MANAGEMENT WITHOUT RE-OPERATION BY APPLICATION OF BURHENNE BILIARY CATHETER AND DORMIA TUBE. (Fre.) Vankemmel, M.; L'Hermine, C. (Cite Hospitaliere, 59000 Lille, France). *Ann. Chir.* 28(9):721-724; 1974.

3734 TUBERCULOSIS OF THE GALLBLADDER: REPORT OF THREE CASES. (Fre.) Ziarek, S.; Deddouche, M.; Zoubir, Y.; Taleb, M. (Clinique chirurgicale A, C.H.U., Oran, Algeria). *Med. Chir.* 4(4):219-222; 1975.

See also, 3073, 3263, 3266, 3272, 3278, 3280, 3281, 3282, 3283, 3285, 3286, 3298, 3300, 3310, 3427, 3510, 3544, 3577.

GENERAL

3735 IN VITRO SYNTHESIS OF IMMUNOGLOBULINS, SECRETORY COMPONENT, COMPLEMENT AND LYSOZYME BY HUMAN GASTROINTESTINAL TISSUES. II. PATHOLOGICAL TISSUES. (Eng.) McClelland, D. B. L.; Shearman, D. J. C.; Lai A Fat, R. F. M.; Van Furth, R. (Dept. Therapeutics, Univ. Edinburgh, Edinburgh, Scotland). *Clin. Exp. Immunol.* 23(1):20-27; 1976.

The possible demonstration of alterations in the synthesis of specific proteins by the gut mucosa was studied in a variety of gastrointestinal disorders. An *in vitro* culture technique was used to study protein synthesis in biopsies of human gastrointestinal mucosa obtained at endoscopy or surgery from patients with biliary gastritis, atrophic gastritis, peptic ulcer, gastric cancer, celiac diseases, Crohn's disease, or ulcerative colitis. The most striking disturbance in immunoglobulin (Ig) synthesis in the stomach occurred in patients who had marked bile reflux and severe gastritis, seen at endoscopy and confirmed by histology, indicating a gastritis with a marked inflammatory infiltrate. Increased IgA synthesis was not found in treated or untreated celiac disease. In dermatitis herpetiformis, slight increases in IgG and IgM synthesis in jejunal biopsies were noted. In Crohn's disease, IgG synthesis was increased in the inflamed tissue. Studies of lysozyme and complement synthesis in small bowel mucosa did not indicate marked differences from normal. In active ulcerative colitis, there was an increased mucosal synthesis of IgG, in comparison with normal rectal biopsies, and these returned to near normal in patients who were in remission. The significance of the increased local immunoglobulin synthesis and its relation to the pathogenesis of the diseases studied are not known.

3736 SYNTHESIS OF IMMUNOGLOBULIN AND SECRETORY COMPONENT BY GASTROINTESTINAL MUCOSA IN PATIENTS WITH HYPOGAMMAGLOBULINAEMIA OR IgA DEFICIENCY.

(Eng.) McClelland, D. B. L.; Shearman, D. J. C.; Van Furth, R. (Royal Infirmary, Edinburgh, Scotland). *Clin. Exp. Immunol.* 25(1):103-111; 1976.

Biopsies of intestinal mucosa from five patients with adult hypogammaglobulinemia and from three patients with selective immunoglobulin (Ig) A deficiency were studied to determine their ability to synthesize Ig's and secretory component (SC). Tissue fragments were cultured *in vitro* in medium containing ^{14}C-labeled amino acids, and newly synthesized proteins were detected by radio-immunoelectrophoresis. Synthesis of IgA, and in some cases of IgG and IgM, was found in intestinal mucosal biopsies from hypogammaglobulinemics and IgA deficient subjects. Free secretory component synthesis was found in cultures from all of the patients. Labeling of the IgA-SC was not detectable in any of the cultures from the hypogammaglobulinemic patients, and it was weakly visible in cultures from two of the three IgA deficient subjects. The lack of detectable IgA-SC synthesis contrasts with the findings in cultures of normal intestinal mucosa in which labeling of both free SC and IgA-SC lines was observed. Tissue sections of these biopsies, studied by immunofluorescence, demonstrated immunoglobulin bearing cells. Many cells had the morphology of plasma cells, but some had a more lymphocyte-like appearance with a thin layer of fluorescing cytoplasm. The findings demonstrate that immunoglobulin synthesizing cells are present in the intestinal mucosa of immunoglobulin deficient individuals. Local immunoglobulin synthesis may explain partially why these patients do not often have major problems with intestinal infections.

3737 SELECTIVE ARTERIAL EMBOLIZATION FOR CONTROL OF MASSIVE UPPER GASTROINTESTINAL BLEEDING.

(Eng.) Reuter, S. R.; Chuang, V. P.; Bree, R. L. (Dept. Radiology, Wayne County General Hosp., Eloise, MI 48132). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(1):119-126; 1975.

The use of selective embolization of the bleeding artery was evaluated in 15 patients with massive upper gastrointestinal bleeding. Successful control of the bleeding was achieved in 11 of the 15 patients. In nine patients in whom control was immediate, the nasogastric return changed from bright red to pink to almost clear over a 5-to 15-min period. Of these 11 patients, 9 were still alive and well 2-18 months after embolization. One patient died of pneumonia, unrelated to the bleeding, 11 months after embolization. The other patient had no bleeding for 2 weeks, but then a repeat massive hemorrhage was caused by hemorrhagic gastritis. Of the four patients who were not controlled, one had a large gastric ulcer eroding into a major branch of the left gastric artery and exsanguinated in 20 hr. The other three, who had diffuse hemorrhagic gastritis, died of complications secondary to gastric surgery 1 month following embolization. Follow-up angiograms were done in five patients receiving Amicar clot, in two receiving Gelfoam, in one receiving Oxycel, and in one receiving fat emboli. Most of the previously occluded branches were again patent but no active bleeding was seen in all patients receiving Amicar-mixed blood clot. In patients receiving Gelfoam and Oxycel, the entire left gastric artery was thrombosed at the second examination, indicating that clot had propagated proximally from the site of the occlusion. The patient receiving fat emboli fell between the two extremes with a few branches open, but most occluded. Preliminary results from these studies are encouraging.

3738 SELECTIVE INTRAARTERIAL INFUSION OF VASOPRESSIN FOR CONTROL OF GASTROINTESTINAL BLEEDING: EXPERIENCE WITH 35 CASES.

(Eng.) Melson, G. L.; Geisse, G.; Stanley, R. J. (Washington Univ. Sch. Medicine, 510 S. Kingshighway, St. Louis, MO 63110). *Gastrointest. Radiol.* 1(1):59-65; 1976.

Experience with intra-arterial infusion of vasopressin to control 35 episodes of variceal and arterial gastrointestinal bleeding in 32 patients is presented. Active bleeding was from esophageal varices in 11 cases and from an arterial site in 22 (stomach, 11; duodenum, 1; jejunum, 2; colon, 7; and liver, 1), including a jejunal diverticulum and a colonic ulcer in Bechet's disease. Two patients, not actively bleeding, were infused for portal decompression before an elective mesocaval shunt. Active bleeding was controlled by the infusion of 0.2 or 0.3 U/min vasopressin (15 min-70 hr), in 64% of patients with variceal hemorrhage and in 59% of those with arterial sources. There were no significant complications directly attributable to this therapy. It is concluded that selective intra-arterial vasopressin infusion is an effective and relatively safe therapy for gastrointestinal hemorrhage from a variety of lesions.

3739 IMMUNOSTIMULATION WITH INTRAPERITONEALLY ADMINISTERED BACILLE CALMETTE GUERIN FOR ADVANCED MALIGNANT TUMORS OF THE GASTROINTESTINAL TRACT.

(Eng.) Falk, R. E.; MacGregor, A. B.; Landi, S.; Ambus, U.; Langer, B. (Dept. Surgery, Univ. Toronto, Canada). *Surg. Gynecol. Obstet.* 142(3):363-368; 1976.

Thirty-five patients treated with i.p. bacille Calmette Guerin (BCG) and then given intermittent systemic chemotherapy and p.o. boosters of BCG were studied to determine the most effective route of administration for nonspecific immunostimulating bacterial antigens. Two treatment schedules were followed. Schedule one called for 2 mg BCG, i.p. followed 5 weeks later by 120 mg BCG p.o.; during weeks 6, 7, and 8, 0.75-1.0 g fluorouracil, i.v., were administered. The latter portion of the treatment was repeated in four week cycles. Schedule two called for 2 mg BCG, i.p., followed, on day 14, by 1 g fluorouracil and 1-2 g cyclophosphamide, i.v., and on day 18 by 120 mg BCG p.o. Treatment given on days

14 and 18 was repeated at monthly intervals. Eight patients had carcinoma of the stomach with a mean survival of 11 months from time of diagnosis and 9.4 months from start of BCG treatment. Three patients are still alive, two with no progression of disease. Eight patients had carcinoma of the pancreas or biliary system. The mean survival time for this group was 14.4 months. Two are still alive but have evidence of disease progression. Nineteen patients had carcinomas of the colon with metastases. Of these 19, 9 had metastases to the liver and 6 of these 9 remain alive, with a mean survival time of 12.8 months for the survivors and 13.2 months over-all for the group. This represents an improved survival time over that of literature controls. The i.p. administration of BCG was followed by a brisk, febrile reaction from which the patient recovered within 2-5 days. A low grade peritoneal reaction persisted with low grade fever and malaise in some patients, particularly in those with previous marked hypersensitivity to tuberculin. Treatment for 1 week with 300 mg daily of isoniazid relieved the peritonitis. It is concluded that the combination of i.p. BCG followed by p.o. administration and cytotoxic drugs increased survival time in this consecutive series of patients when compared to historical controls. Response was most marked in patients with metastases to the liver from primary carcinoma of the colon.

3740 ROLE OF TOXIGENIC AND INVASIVE BACTERIA IN ACUTE DIARRHEA OF CHILDHOOD. (Eng.)

Guerrant, R. L.; Moore, R. A.; Kirschenfeld, P. M.; Sande, M. A. (Univ. Virginia Sch. Medicine, Charlottesville, VA 22901). *N. Engl. J. Med.* 293(12): 567-573; 1975.

The cause of acute diarrhea was investigated in 40 infants and children by examining stools for fecal leukocytes. A potential etiologic agent was identified in the stools of 31 patients (77.5%). In 20 of these, only toxigenic organisms were isolated. Toxigenic strains of *Escherichia coli* were serotyped from 19 patients. Seven had both toxigenic and invasive *E. coli* or salmonella isolated, and four had only invasive pathogens. Nineteen patients showed fecal leukocytes, which were predominantly polymorphonuclear. Leukocytes were found in 9 of the 11 with invasive organisms, whereas only 4 of 20 with toxigenic strains, alone, had fecal leukocytes. Of nine patients without a demonstrable pathogen in their stools, six had fecal leukocytes, suggesting an invasive process. All 27 patients with toxigenic organisms isolated had organisms that produced heat-labile cholera-like toxin. Three patients had *E. coli* that also produced a heat-stabile toxin. No organisms, which produced heat-labile toxin or tissue invasion, were observed in 20 controls. However, there was one *E. coli* that produced only heat-stable toxin and one salmonella. Chinese-hamster-ovary cell assay demonstrated that the stronger the response to the assay, the greater the toxin concentration. This response was reduced in a step-wise fashion by serial dilution. The observation that the toxin-producing capacity of the organisms varied from strain to strain was confirmed in the rabbit-ileal-loop assay. When tested in the guinea pig-conjunctivitis model to determine the ability of these strains to cause tissue invasion, nine *E. coli* strains caused inflammatory conjunctivitis. Seven of the patients who had these strains had fecal leukocytes. When testing four of the five strains of salmonella, two produced tissue invasion and both were from patients with fecal leukocytes. Of the six patients in this series with temperatures over 39.4 C, five had salmonella, heavy parasitic infestation or fecal leukocytes, indicating an invasive bowel process. It is concluded that in this pediatric population, *E. coli* appears to cause most acute diarrheas due to toxigenic and invasive pathogenic mechanisms.

3741 INFANTILE GASTROENTERITIS: A CLINICAL STUDY OF REOVIRUS-LIKE AGENT INFECTION.

(Eng.) Shepherd, R. W.; Truslow, S.; Walker-Smith, J. A.; Darnell, R.; Barker, C. M. (Queen Elizabeth Hosp. Children, Hackney Road, London E2 8PS, England) *Lancet* 2(7944):1082-1084; 1975.

A clinical study was conducted in 32 infants with symptoms from infections with the human reovirus-like agent (RLA). RLA was identified by electron microscopy of fecal extracts. A fairly consistent clinical pattern was found in 30 patients who had a gastroenteritis-like illness. The disease was usually mild, affecting mainly infants of less than 2 yr and males more commonly than females. The incubation period appeared to be 48-72 hr; the onset was sudden, often with vomiting during the first 1-2 days of illness. Loose yellow-green offensive stools without blood or mucus developed after variable time periods, and there was often accompanying fever. Severe dehydration and electrolyte imbalance were uncommon, and with standard treatment the illness was uncomplicated, usually lasting 5-8 days. These features resemble those of previously reported winter epidemics of infantile nonbacterial gastroenteritis and it is suggested that these epidemics were due to RLA. Two infants in whom RLA was identified in the stool did not have a gastroenteritis-like illness although both had protracted diarrhea. It is suggested that this is a result of persistent virus excretion in some infants with delayed recovery following acute gastroenteritis.

3742 VIRAL GASTROENTERITIS INDUCED BY THE HAWAII AGENT: JEJUNAL HISTOPATHOLOGY AND SEROLOGIC RESPONSE.

(Eng.) Dolin, R.; Levy, A. G.; Wyatt, R. G.; Thornhill, T. S.; Gardner, J. D. (Natl. Inst. Allergy Infectious Diseases, LCI, Building 1D, Room 11N-214, Bethesda, MD 20014). *Am. J. Med.* 59(6):761-768; 1975.

Peroral jejunal biopsies were performed in seven normal subjects prior to, 48 hr after, and 2 weeks after the administration of the Hawaii agent of viral gastroenteritis (4.3-5.0 cm^3). Light and electron microscopic examination revealed an intact mucosa with blunted villi, shortened and distorted microvilli, swollen mitochondria, and intercellular edema. These histologic changes were seen only in acutely ill subjects and were absent 2 weeks after illness in three of four who were previously ill. This reversible lesion was similar to, but not identical with, that previously described in viral gastroenteritis induced by the Norwalk agent. Serum antibody increases in response to the Hawaii agent, as measured by immune electron microscopy, were present in three of the four ill subjects and in none of the three who remained well. These studies indicate that infection with the Hawaii agent of viral gastroenteritis can result in reversible histologic lesions in the jejunal mucosa, which are temporally associated with the development of clinical illness, and which are accompanied by serum antibody rises to the Hawaii particle.

3743 THE GARDNER SYNDROME: A STUDY IN CELL CULTURE. (Eng.) Danes, B. S. (Cornell Univ. Medical Coll., New York, NY 10021). *Cancer* 36(6):2327-2333; 1975.

Experiments were conducted to investigate the existence of a cell marker for the presence of the gene responsible for the Gardner syndrome. Tetraploidy was increased in skin fibroblast cultures derived from 3 probands with the Gardner syndrome and from 9 affected members of 1 family as compared to that occurring in cultures from 5 unaffected family members as well as from 6 relatives by marriage and from 15 normals grown in the laboratory at the same time under the same conditions (Eagle's minimum essential medium containing 20% human AB serum, and 5% beef embryo extract ultrafiltrate; pH 7.0-7.4). Tetraploidy was present at the first subculture (2 weeks after the initial biopsy was cultured) and for each line studied, the percentage of dividing cells showing tetraploidy remained constant. Increased occurrence of tetraploidy was not observed in skin fibroblast cultures from patients with the genetic disorders: familial polyposis coli (2 probands and 1 family member), familial osteomas (1 proband), and familial fibromatosis (neurofibromatosis, 2 probands), each of which show one of the four abnormal tissue growths observed in the Gardner syndrome. The relation of the observed tetraploidy to the increased risk of such patients to develop abnormal growths and cancer has not been established. The increased tetraploidy should be of value in identifying the presence of the gene for the Gardner syndrome in high risk families.

3744 MAGNESIUM ABSORPTION IN THE HUMAN SMALL INTESTINE. RESULTS IN NORMAL SUBJECTS, PATIENTS WITH CHRONIC RENAL DISEASE, AND PATIENTS WITH ABSORPTIVE HYPERCALCIURIA. (Eng.) Brannan, P. G.; Vergne-Marini, P.; Pak, C. Y. C.; Hull, A. R.; Fordtran, J. S. (Univ. Texas Health Science Center, Dallas, TX 75235). *J. Clin. Invest.* 57(6):1412-1418; 1976.

Magnesium (Mg) absorption was investigated in the jejunum and ileum of 14 healthy volunteers, through *in vivo* intestinal perfusion studies. Test solutions contained from 0 to 20 mM Mg in the form of $MgCl_2$. The rate of absorption in the jejunum increased progressively as luminal Mg concentrations increased, with a tendency toward saturation at the higher concentrations. Kinetics and rates of Mg absorption in the ileum were comparable to those in the jejunum. The only exception was that at higher luminal concentrations, the ileal absorptive process was fully saturated. Calcium had little or no influence on Mg absorption, even though it was noted that Mg decreased calcium absorption to a limited degree. Patients with a reduced rate of calcium absorption in end-stage renal disease had a severely depressed Mg absorption. However, patients with absorptive hypercalciuria and nephrolithiasis showed increased rates of calcium absorption and had normal absorption of Mg. It is suggested that Mg absorption in the human is mediated by a transport process, which is different from that which facilitates calcium absorption. Also, normal Mg absorption may be dependent upon vitamin D. It was not established whether the normal intestine can absorb Mg against an electrochemical gradient. As the experiments did not contain glucose or other nutrients, and since they were designed to result in near zero movement in water, the results may not be directly applicable to normal physiological conditions within the gastrointestinal tract.

3745 GASTROINTESTINAL TUBERCULOSIS. (Eng.) Wales, J. M.; Mumtaz, H.; MacLeod, W. M. (Wessex Cardiac and Thoracic Center, Oakley Road, Southampton, England). *Br. J. Dis. Chest* 70(1): 39-57; 1976.

Case reports of 14 patients with gastrointestinal tuberculosis are presented. No pathognomic features were revealed either on history or by examination. The differential diagnoses included carcinoma of the colon, appendicitis, amebiasis, actinomycosis, ulcerative colitis, and granulomatous bowel disease. Primary ileocecal tuberculosis, with no evidence of other disease, was noted in only two patients. In a single case, a positive culture from the gut was obtained and the human bacillus was isolated. Eleven of the patients had positive sputum culture, and in each case the human organism was isolated. *Mycobacterium tuberculosis* was isolated in a case where there was extensive pulmonary disease; a negative culture in the presence of isolated gut disease was misleading in one patient. Concomitant pulmonary disease was noted in 12 patients; chest radiographs showed extensive changes consistent with tuberculosis usually of the fibrocaseous type with or without cavitation in 10 of them. It is suggested that radiological appearance of contrast studies of the gut often suggest, but seldom diagnose tuberculosis. Changes resulted from inflammatory masses, thickening of the bowel wall, ulcers, and fistulas. The tuberculin reaction was positive by the Heaf multiple puncture technique or the Mantoux reaction in eight patients. In five cases, serious complications due to stricture formation were noted. Five patients were treated with corticosteroids, and no adverse effects were noted in four of them; in addition, there was no evidence of further stricture formation during healing. It is concluded that surgical treatment is necessary for strictures, perforations, and obstruction.

3746 VASCULITIS WITH HEPATITIS B ANTIGENEMIA: LONG-TERM OBSERVATIONS IN NINE PATIENTS. (Eng.) Sergent, J. S.; Lockshin, M. D.; Christian, C. L.; Gocke, D. J. (Vanderbilt Univ. Sch. Medicine, Nashville, TN 37232). *Medicine* 55(1):1-18; 1976.

Nine biopsy proven cases of hepatitis B-associated necrotizing vasculitis are reported. Of the nine patients, three died of vasculitis, one died of chronic hepatitis several years after sustaining permanent neurological debility from vasculitis, and five are still surviving. Of the survivors, only one is currently symptom-free, two have residual neurological deficits, one of whom has chronic active liver disease, and two have residual hypertension, one of whom is azotemic. All survivors have remained hepatitis B antigen positive. The fact that these patients had liver disease separated them from patients with generalized vasculitis who were hepatitis B antigen negative. No relation was found between the appearance of the vasculitis and the liver disease. The activity of the vasculitis was unrelated to the activity of the hepatitis. Vasculitis was always transient, of a few months duration, and never recurred, even though liver disease progressed in some patients. The pathogenesis of this disease is not clear, but it is suspected that circulating complexes of hepatitis B antigen and antibody are pathogenic in this syndrome.

3747 THE VALUE OF A HISTAMINE H_2-RECEPTOR ANTAGONIST IN THE MANAGEMENT OF PATIENTS WITH THE ZOLLINGER-ELLISON SYNDROME. (Eng.) Richardson, C. T.; Walsh, J. H. (Univ. Texas Health Science Center at Dallas, 5323 Harry Hines Blvd., Dallas, TX 75235). *N. Engl. J. Med.* 294(3):133-135; 1976.

Inhibition of acid secretion by metiamide was assessed in three patients with the Zollinger-Ellison syndrome. Metiamide (200 or 300 mg), administered by nasogastric tube, inhibited acid secretion transiently (2.5 hr) by 85-100% in all patients. Although anticholinergic drugs, alone, inhibited acid secretion by only 0-35% in these patients, the combination of metiamide and anticholinergic markedly prolonged the inhibitory effect of metiamide. Total gastrectomy was refused by one patient, and was impossible in another; both were treated with metiamide and anticholinergic for 5 and 10 months, resp. A third patient was treated with metiamide and anticholinergic for 3 weeks in preparation for total gastrectomy. Ulcer pain and diarrhea disappeared, and all gained weight. It is concluded that H_2-receptor antagonists may be useful in the treatment of some patients with the Zollinger-Ellison syndrome.

3748 EXOCRINE PANCREATIC FUNCTION IN MAN AFTER CYTOTOXIC TREATMENT. (Eng.) Fleischer, K.; Meckel, H. (Medical Clinic Univ. Wurzburg, 87 Wurzburg, Josef-Scheider-Weg 2, Germany). *Acta Hepatogastroenterol. (Stuttg.)* 22(6):392-398; 1975.

The function of the exocrine pancreas was studied in patients with malignant disease, before and after massive dose therapy with cyclophosphamide and before and after combined cytotoxic treatment. Patients were studied using the secretin-pancreozymin test and were divided into four groups, depending upon the type of therapy and the conduct of the examination. In group I, four patients received a single massive dose of 30-40 mg/kg cyclophosphamide. In group II, two patients received 2.5 mg/kg procarbazine p.o. for 2 weeks, 0.03 mg/kg vincristine i.v. on days 1 and 8, and 15 mg/kg cyclophosphamide on days 2 and 9. In group III, five patients received oral doses of cyclophosphamide totaling 6-55 g for 2-18 months. In group IV, four patients were given 172-1,689 mg busulfan for 3-57 months. In the patients on massive dose or continued therapy with cyclophosphamide, the volume of the duodenal secretion and the bicarbonate, electrolyte, and enzyme outputs in the duodenal secretion remained essentially unchanged. In contrast, cytotoxic combination treatment resulted in decreased activities of amylase and lipase, and in some cases of trypsin. After maintenance treatment with busulfan, a reduction of the trypsin and amylase activities was detectable; chymotrypsin and lipase were slightly lowered. In these studies, there is no evidence of impaired exocrine pancreatic function in man following massive dose therapy or prolonged treatment with cyclophosphamide.

3749 SOME CHANGES OF THE CANALICULAR CELLS IN PANCREAS WITH DILATED ACINI. (Eng.) Gonzalez Cueto, D. M.; Olmedo, G. S.; Naveiro, J. J. (Hospital Ramos Mejia, Urquiza 609, Buenos Aires, Argentina). *Medicina (B. Aires)* 35(4):407-415; 1975.

The percentage of pancreatic surface occupied by the canalicular cell mass over the total exocrine tissue was calculated in autopsy samples to determine whether the canaliculi increase in size in pancreas with dilated acini. This percentage was correlated with the number of dilated acini and the blood levels of urea (BUN) determined during the last 24 hr prior to death. The surface occupied by the canalicular cell mass had a positive correlation with the number of dilated acini and with the levels of BUN. However, the number of dilated acini did not correlate with the levels of BUN ($p>0.5$). Thus, the enlargement of the canalicular cell mass is an earlier and more frequent change than is the acinar dilatation in the pancreas of uremic patients. Acinar dilatation is due to dilatation of the intracinar portion of the canaliculi, which occurs as a final step of the cellular enlargement. The acinar cells do not participate in this process. Some alteration in the mechanism by which the canalicular cells share in the secretion of bicarbonate by the pancreas may trigger these histologic changes. This change may be related to metabolic acidosis.

3750 DIFFERENTIAL DIAGNOSIS OF ACUTE ABDOMINAL PAIN. (Fre.) Ruyters, L. (Institut de Medecine, Universite de Liege, Liege, Belgium). *Rev. Med. Liege* 31(2):57-61; 1976.

3751 EFFECT OF PATHOLOGY OF THE DIGESTIVE SYSTEM ON THE SKIN FUNCTION DURING DERMATOSIS. (Rus.) Mar'iasis, E. D.; Shakhtmeister,

I. Ia.; Chebotarev, V. V. (Stavropol Medical Inst., Stavropol, USSR). *Sov. Med.* (6):147-148; 1975.

3752 ENDOSCOPIC POLYPECTOMY IN THE UPPER GASTROINTESTINAL TRACT. (Nor.) Osnes, M.; Myren, J.; Serck-Hanssen, A. (Ulleval sykehus, Ulleval, Norway). *Tidsskr. Nor. Laegeforen.* 95(22):1221-1223; 1975.

3753 SIGNIFICANCE OF QUANTITATIVE DETERMINATION OF CHLORIDE IN THE GASTRIC CONTENT FOR THE DIAGNOSIS OF SECRETORY DISORDERS IN PATIENTS WITH DISEASES OF THE GASTROINTESTINAL TRACT. (Rus.) Matsaenko, N. K. (Kiev Medical Inst., Kiev, USSR). *Ter. Arkh.* 47:92-97; 1975.

3754 APPLICATION OF CONTROLLED THERAPEUTIC TRIALS IN SURGERY. (Fre.) Jortay, A. (Service de Chirurgie, Institut Jules Bordet, Avenue de la Tenderie 76, B-1170 Brussels, Belgium). *Acta Chir. Belg.* 75(1):39-103; 1976.

3755 CLASSIFICATION OF CHRONIC DISORDERS IN NUTRITION IN YOUNG CHILDREN. (Rus.) Zaitseva, G. I.; Stroganova, L. A. (S. M. Kirov Leningrad Inst. Postgraduate Training Physicians, Leningrad, USSR). *Pediatriia* (11):20-25; 1975.

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3758 SOME INDICES OF REDOX PROCESSES IN CHRONIC DISORDERS OF NUTRITION IN YOUNG CHILDREN. (Rus.) Karakhodzhaev, B. Kh.; Priev, I. G.; Rusmanov, M. R. (Samarkand Medical Inst., Smarkand, USSR). *Pediatriia* (11):31-33; 1975.

3759 THE EFFECT OF A DIET ENRICHED WITH POLYUNSATURATED FATTY ACIDS ON SOME ASPECT OF METABOLISM AND THE EVOLUTION OF ACUTE GASTROINTESTINAL DISEASES IN INFANTS OF THE FIRST YEAR OF LIFE. (Rus.) Balezina, T. A.; Misnik, V. P.; Mikhnovskaia, E. G. (Kiev Scientific Res. Inst. Pediatrics, Obstetrics and Gynecology, Kiev, USSR). *Vopr. Pitan.* (4):31-36; 1975.

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3762 DIFFERENT TRACE ELEMENTS AS INFLUENCING THE MOLECULAR SIZE AND THE AMINO ACID COMPOSITION OF THE PEPTIDES IN THE PEPTIC IN VITRO DIGESTION OF SOYBEAN PROTEIN. (Ger.) Beyer, M. G.; Kirchgessner, M.; Steinhart, H. (Institut fur Tierernahrung, Technische Universitat, Munchen, Freising-Weihenstephan, W. Germany). *Landwirtschaftl. Forsch.* 28(4):278-287; 1975.

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3765 ABSORPTION CAPACITY OF INTESTINAL MUCOSA IN PATIENTS WITH CHOLERA. (Rus.) Dubova, A. V.; Bobkova, E. D.; Shalygina, N. B.; Bogomolov, B. P. (Astrakhan Branch, Central Inst. Epidemiology, Astrakhan, USSR). *Ter. Arkh.* 47(8):93-96; 1975.

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3767 PRACTICAL OBSERVATIONS ON INFECTIOUS DIARRHEA IN INFANTS AND SMALL CHILDREN. (Hun.) Dudas, P. (Budapest Fovarosi Laszlo Korhaz III, Gyermekosztaly, Budapest, Hungary). *Gyermekgyogyaszat* 26(1):37-40; 1975.

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3772 CLINICO-MORPHOLOGICAL CHARACTERISTICS OF DIFFERENT FORMS OF DYSENTERY. (Rus.) Iushchuk, N. D.; Shalygina, N. B.; Mashilov, V. P. (Central Scientific Res. Inst. Epidemiology, USSR Ministry of Health, Moscow, USSR). *Sov. Med.* (10): 119-124; 1975.

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3783 GENERALIZED FAMILIAL SEMIBENIGN BCG INFECTION, Salmonella OSTEOMYELITIS AND INTESTINAL PSUEDOTUBERCULOSIS--DUE TO A FAMILIAL DEFECT OF THE MACROPHAGE SYSTEM? (Ger.) Heyne, K. (Universitats-Kinderklinik, D-2300 Kiel, Frobelstrasse 15/17, W. Germany). *Eur. J. Pediatr.* 121(3):179-189; 1976.

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3800 OCCLUSIONS OF THE DIGESTIVE TRACT IN NEWBORN BABIES: REPORT OF 11 CASES OBSERVED IN THREE YEARS (JAN. 1971 TO DEC. 1973) AT SERVICE DE PEDIATRIE ET GENETIQUE MEDICALE DU C.H.R. DE BREST. (Fre.) Castel, Y.; Roche, J.; Lejeune, B. (Service de Pediatrie et Genetique Medicale du C.H.R. de Brest, Brest, France). *Ouest Med.* 29(3):159-168; 1976.

3801 PEUTZ-JEGHERS SYNDROME. (Rus.) Grebenev, A. L.; Molchanova, Zh. I.; Sattarova, M. K.; Filimonov, R. M.; Al'tshuller, E. N. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Klin. Med.* 54(4):101-104; 1976.

3802 DIAGNOSIS AND TREATMENT OF RECURRENT EMESIS. (Ger.) Gruttner, R. (Univ.-Kinderklinik, Martinistr. 52, D-2000 Hamburg 20, W. Germany). *Monatsschr. Kinderheilkd.* 124(5):328-330; 1976.

3803 SERUM PROTEIN EXCRETED IN STOOLS IN SALMONELLOSIS IN CHILDREN. (Pol.) Jankowski, A.; Remion, J. (Kliniki Chorob Zakaznych Wieku Dzieciecego ul. Bujwida 44, 50-345 Wroclaw, Poland). *Pediatr. Pol.* 50(7):853-860; 1975.

See also, 3257, 3266, 3276, 3288, 3302, 3305, 3350, 3360, 3428, 3436, 3483, 3484, 3485, 3491, 3497, 3633, 3804.

Parasitology

3804 HUMORAL IMMUNITY OF PARASITIZED, MALNOURISHED CHILDREN. (Eng.) Purtilo, D. T.; Riggs, R. S.; Evans, R.; Neafie, R. C. (Univ. Massachusetts Medical Sch., 55 Lake Ave. North, Worcester, MA 01605). *Am. J. Trop. Med. Hyg.* 25(2):229-232; 1976.

The nutrition, intensity of parasitism, complete blood count, and serum immunoglobulin (Ig) concentration were determined in 63 children. The children were categorized according to their degree of malnutrition using the Gomez scale. The hemoglobin values were lower for the seven protein calorie malnutrition (PCM) groups (10.6 g/100 cm^3 and 10.4 g/100 cm^3) than for the normals (11.4 g/100 cm^3) and children with first degree PCM (11.2 g/100 cm^3). The average serum transferrin concentrations ranged from 328 mg/100 cm^3 for the first degree PCM group to 214 mg/100 cm^3 for the third degree PCM group. The differences in transferrin concentrations among groups were statistically significant ($p<0.01$). Moderate leukocytosis was present in 53 of the 63 subjects, the values ranging from 5,706/mm^3 to 28,900/mm^3. There was a significant correlation between the eosinophil count and the intensity of parasitism ($p=0.026$). The IgA and IgM concentrations were moderately increased; the IgG was increased threefold, and the IgE was markedly increased in concentration. The concentrations of the immunoglobulins were related significantly ($p=0.004$ IgA, $p=0.008$ IgE) to the intensity of parasitism. The results indicate that the concentrations of immunoglobulins, especially IgE, are significantly correlated with the intensity of parasitism by nematodes.

3805 IMMUNOLOGICAL STUDY ON MIGRATION OF ASCARIS INTO THE BILIARY TREE. (Eng.) Torisu, M.; Fukawa, M.; Harasaki, H.; Kitamura, K.; Kai, S.; Nagano, M.; Ikeda, S.; Hisatsugu, T.; Nishimura, M.; Dohy, H.; Baba, T.; Sonozaki, H. (Kyushu Univ. Sch. Medicine, Fukuoka 812, Japan). *Clin. Immunol. Immunopathol.* 4(4):467-477; 1975.

Immunological studies were performed on six patients with ascaris migration into the biliary tree. Studies were performed before and after surgical exploration of the biliary tree, using skin tests, complement fixation, and hemagglutination tests. Of these, the skin test, using purified ascaris antigen, was found to be the most sensitive. The serum immunoglobulin (Ig) E level was increased before the operation (3,300-9,440 mg/ml) in all six cases. After removal of the migrated ascaris at surgery, the serum IgE level decreased to normal range within 1 month. Prausnitz-Kustner reactions (P-K) were performed in eight healthy volunteers, using the patients' sera before and after the operation. Only sera from preoperative patients gave positive P-K reactions. These findings suggest that the preoperative increase in serum IgE is attributable to the ascaris infestation. The purified ascaris antigen was found to have a high chemotactic effect on eosinophils, even at concentrations of 0.1 γ/ml. The data confirm the presence of potent chemotactic activity in the body constituents of the worm. The previously described complement-derived or lymphocyte-derived chemotactic factors are secreted by the host, suggesting that the ascaris-derived eosinophil chemotactic factor differs from the other factors.

3806 SERUM ANTIBODIES AND JEJUNAL HISTOLOGY IN GIARDIASIS ASSOCIATED WITH MALABSORPTION. (Eng.) Ridley, M. J.; Ridley, D. S. (Hosp. Tropical Diseases, St. Pancras Way, London, NW1 OPE, England). *J. Clin. Pathol.* 29(1):30-34; 1976.

Possible antibody response to *Giardia lamblia* was studied in the sera of 70 patients with malabsorption, 2 patients with asymptomatic giardiasis, and 17 non-tropical patients used as controls. The indirect immunofluorescent test (IFT) results at a screening dilution of 1/10, using precyst antigen, showed that 32 of 36 patients with giardiasis and malabsorption were positive; none of the 17 controls was positive. Sera from 18 serologically positive patients were tested 1 month or more after treatment for giardiasis, and the IFT showed a decrease in 11 cases and no change in 8. In six of six giardiasis sera, the IFT antibody was immunoglobulin (Ig) G. Tests with IgA and IgM were negative. In a direct fluorescent test on cryostat sections of jejunum in 10 cases of giardiasis with a short history of about 1-month duration and moderately severe histologic change, plasma cells in the lamina propria showed increased fluorescence with the anti-IgM serum, in comparison with normal control jejunum. In the early stages of the infection, immunoglobulin production by plasma cells was predominantly IgM. Further tests suggest that although immunodeficiency may be associated with giardiasis, the latter is not necessarily the cause of an immunoglobulin deficiency. The histological changes of malabsorption in jejunal mucosa were graded from 0 to V. In the two patients with giardiasis without malabsorption, the jejunum was within normal histological limits, grade 0. In 36 patients with giardiasis and malabsorption, the histological grading was 0, I, or II in 4, 12, and 20 cases, resp. A rough correlation between antibody titer and the severity of the histological lesion in the jejunum was noted. In searching for yeasts in the centrifuge deposit of jejunal juice of the malabsorption patients, no association with giardiasis was found.

3807 MORBIDITY IN Schistosomiasis mansoni IN RELATION TO INTENSITY OF INFECTION: STUDY OF A COMMUNITY IN MACHAKOS, KENYA. (Eng.) Siongok, T. K. A.; Mahmoud, A. A. F.; Ouma, J. H.; Warren, K. S.; Muller, A. S.; Handa, A. K.; Houser, H. B. (Ministry of Health, Nairobi, Kenya). *Amer. J. Trop. Med. Hyg.* 25(2):273-284; 1976.

A cross-sectional study of the prevalence and intensity of *Schistosmiasis mansoni* was conducted on 83% of the population (416 individuals from 90 households) of the village of Lower Nduu, Machakos, Kenya. The findings were correlated with morbidity, as determined by standard medical examinations. The male:female ratio was 44:56 and more than 50% of the subjects were under 20 yr of age. Malaria was of very low endemicity in the area. The incidence of intestinal helminths and *Schistosoma haematobium* was also low. *S. mansoni* infection had an overall prevalence of 82%, with a peak of 98% in the 10-19 yr age group, and a decline to about 70% in the older population. With respect to intensity, 12% were uninfected, 28% had light infection, 21% had moderate infection, and 33% had severe infections. Extremely severe infections with egg counts of over 1,000/g of feces occurred in 16%. Females aged 10-14 yr showed peak intensity of 1,026 eggs/g and males showed peak intensity of 1,019 eggs/g at age 20-24 yr. Histories of weakness or inability to work occurred in only a small portion of the population and this was not correlated with the intensity of infection. More of the severely infected individuals suffered abdominal pain. Hepatomegaly was noted more often in those with severe infection, and splenomegaly occurred in 7% of those patients with egg counts of over 400/g. Hepatosplenomegaly was noted in almost 3% of the population studied; most of these patients were under 21 yr of age, and all were infected with *S. mansoni* (58% of them had high egg counts). Liver function tests were within normal limits for most of the patients. Two of the patients had esophageal varices, but these and seven others studied by splenoportography had patent portal veins. It is concluded that disease manifestations are observed largely in those persons with severe infection.

3808 PATHOGENESIS, DIAGNOSIS AND CLINICAL ASPECTS OF HYDATID DISEASE OF THE LIVER. (Ger.) Bub, E.; Stolze, Th.; Strohmeyer, G. (II. Medizinische Klinik des Stadtkrankenhauses, D-3500 Kassel, Moenchebergstr. 41-43, W. Germany). *Internist (Berlin)* 16(9):428-435; 1975.

3809 HYDATID CYSTS OF THE LIVER. (Fre.) Tricot, J. F. (Hopital Cochin, 75014 Paris, France). *Rev. Med. Etudes Med.* 17(3):129-130, 132; 1976.

3810 CLINICAL-STATISTICAL DATA ON HYDATID DISEASE OF THE LIVER. (Ita.) Cimmino, P. T. (Istituto di 1ª Clinica Chirurgica, Universita di Roma, Rome, Italy). *Ann. Ital. Chir.* 48(1):47-72; 1976.

3811 DETERMINATION OF UROPEPSIN IN CERTAIN HELMINTHOSES IN CHILDREN. (Rus.) Magdieva, S. R. (L. M. Isaev Uzbek Scientific Res. Inst. Medical Parasitology, Samarkand, USSR). *Pediatriia* (9):84; 1975.

3812 THERAPY OF INTESTINAL PARASITOSES. (Ita.) Fossati, C. (Ente Ospedaliero "E. Morelli," Sondalo, Italy). *Clin. Ter.* 75(1):65-85; 1975.

See also, 3571, 3596, 3718, 3767, 3794.

GENERAL

Regional Enteritis

3813 EXPERIMENTAL REGIONAL ENTERITIS IN PIGS. (Eng.) Kalima, T. V.; Saloniemi, H.; Rahko, T. (Helsinki Univ. Central Hosp., Helsinki 29, 00290 Finland). *Scand. J. Gastroenterol.* 11(4): 353-362; 1976.

To clarify the role of lymphatic obstruction in the pathogenesis of regional enteritis, the mesenterial lymphatics of the terminal ileum were obstructed in 21 pigs. Long-lasting obstruction was produced by injecting 4 ml of formalin into regional lymph nodes. The growth of the pigs was retarded; their ileum became reddish and edematous with numerous intra-abdominal adhesions and mucosal ulcerations. Eleven pigs developed fistulae; none had chylous ascites. Histologically, the subserosa was infiltrated by round and giant cells giving an impression of granulomatous inflammation. Many lymphatics were thrombosed, and the lymphoid tissue was hyperplastic. These changes became more prominent with extensive subserosal fibrosis after 3 weeks, when the edema diminished. Transmural inflammation with round cell aggregates was then the most typical feature. Purulent infection with crypt abscesses appeared near the fistulae. It is concluded that when the function of lymphatics is destroyed, the transport of particles, too large to enter blood vessels, is inhibited. This produces chronic irritation and edema with declining tissue nutrition and oxygenation, thus causing fibrosis. Moreover, the intestinal lumen is a source of infections, and the edematous tissue is easily infected. This may lead to mucosal ulcerations and, progressively, to fistulae.

3814 ABNORMALITIES IN THE APPARENTLY NORMAL BOWEL MUCOSA IN CROHN'S DISEASE. (Eng.) Goodman, M. J.; Skinner, J. M.; Truelove, S. C. (Dept. Medicine, Univ. Chicago, Chicago, IL 60637). *Lancet* 1(7954):275-278; 1976.

Rectal biopsy specimens from 13 patients who had Crohn's disease elsewhere in the bowel, but never in the rectum, were examined to determine plasma cell density, volume of lamina propria, and mucosal glucosamine synthetase activity. The difference in mean plasma cell density in the lamina propria between 13 patients with Crohn's disease and 23 controls (3,935 cells/1,000 points versus 906 cells/1,000 points, resp.) was highly significant ($p<0.001$). There was also a significant difference in the lamina propria volume increase ($p<0.001$) between Crohn's disease patients (124 points/100 intercepts of muscularis mucosa) as compared with controls (52 points/100 intercepts). The mean glucosamine-synthetase levels for the patients with Crohn's disease was 20.55 units, which was a highly significant elevation ($p<0.001$) above the normal mean of 13.91 units. It is suggested that the colonic mucosa is always abnormal in Crohn's disease, although it may appear to be normal on conventional histopathological examinations.

3815 PATHOLOGIC ANATOMY OF CROHN'S DISEASE. (Fre.) Delvigne-van Lancker, M. A. (Laboratoire d'Anatomie pathologique, Universite de Liege, Liege, Belgium). *Rev. Med. Liege* 31(2): 42-51; 1976.

3816 SYMPTOMS, COMPLICATIONS AND EVOLUTION OF CROHN'S DISEASE. (Fre.) Brassinne, A.; Delforge, M. (Institut de Medecine, Universite de Liege, Liege, Belgium). *Rev. Med. Liege* 31(2):37-42; 1976.

3817 MASSIVE INITIAL HEMORRHAGE IN CROHN'S DISEASE IN THE UPPER JEJUNUM. (Ger.) Hofmann, H.; Reitzig, P.; Witter, H. (Bereichs Medizin [Charite], Humboldt-Universitat, DDR-104, Schumannstr. 20/21, E. Germany). *Zentralbl. Chir.* 100(24):1516-1518; 1975.

3818 INTESTINAL CROHN'S DISEASE WITH SUBSEQUENT GASTRIC INVOLVEMENT. (Spa.) Gonzalez, J. A.; Saez, L. R.; Gonzalez-Palacios, F. (Ciudad Sanitaria "Nuestra Senora de Covadonga," Oviedo, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(6):759-770; 1976.

See also, 3268, 3269, 3372, 3496, 3513, 3514, 3735.

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GASTROENTEROLOGY

ABSTRACTS
AND
CITATIONS

NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *International Standard ISO833, 1974*, are used. The two-letter state abbreviations are based on the United States Postal Service Code.

LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	mm	millimeter(s)
ADP	adenosine diphosphate	mOsm	milliosmolar; milliosmeter(s)
AMP	adenosine monophosphate	msec	millisecond(s)
amp	ampere	mV	millivolt(s)
ATP	adenosine triphosphate	min	minute(s)
A	angstrom	MTD	maximum tolerated dose
BSP	sulfobromophthalein	NAD	nicotinamide adenine dinucleotide
C	degrees centigrade	NADH	reduced nicotinamide adenine dinucleotide
cal	calories		
cc	cubic centimeter	NADP	nicotinamide adenine dinucleotidephosphate
cm	centimeter(s)		
dl	deciliter	NADPH	reduced nicotinamide adenine dinucleotidephosphate
DNA	deoxyribonucleic acid		
ED_{50}	median effective dose(s)	ng	nanogram (10^{-9})
EDTA	ethylenediamine tetraacetic acid	nm	nanometer(s)
e.g.	for example	Pa	ambient pressure
EEG	electroencephalogram	PAS	periodic acid - Schiff
ESR	erythrocyte sedimentation rate	pg	picogram (10^{-12})
g	gram(s)	pgEq	picogram equivalent(s)
μg	microgram(s)	p.o.	orally
Hz	Hertz	ppb	parts per billion
hr	hour(s)	ppm	parts per million
i.m.	intramuscular	r	Roentgen
i.p.	intraperitoneal	RBC	red blood cells (erythrocytes), red blood count
IU	international unit(s)		
i.v.	intravenous	resp.	respectively
kcal	kilocalorie(s)	RNA	ribonucleic acid
kg	kilogram(s)	s.c.	subcutaneous
K_m	Michaelis constant	sec	second(s)
LD_{50}	median lethal dose(s)	SGOT	serum glutamic-oxalacetic transaminase
LDH	lactic acid dehydrogenase		
m	meter(s)	SGPT	serum glutamic-pyruvic transaminase
M	molar; mole(s)		
mM	millimolar; millimole(s)	U	unit(s)
μM	micromolar; micromole(s)	UV	ultraviolet
ma	milliampere(s)	V	volt
mCi, μCi	milli-, microcurie(s)	WBC	white blood cells (leukocytes), white blood count
mEq	milliequivalent(s)		
mg	milligram(s)	yr	year(s)
ml, μl	milli-, microliter(s)		

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

9 IDENTIFICATION OF CHOLECYSTOKININ-SECRETING CELLS.

(Eng.) Polak, J. M.;
om, S. R.; Rayford, P. L.; Pearse, A. G. E.;
han, A. M. J.; Thompson, J. C. (Royal Postgraduate
ical Sch., Hammersmith Hosp., London, W12, U.K.).
cet 2(7943):1016-1018; 1975.

unocytochemical techniques and electron microscopy
semi-thin and serial thin sections were utilized
the identification of cholecystokinin (CCK)-pro-
ing cells in the mucosa of the upper small intes-
e of humans, dogs, and pigs. Fresh samples of
trointestinal mucosa (body and antrum of the
mach, duodenum, jejunum, ileum, and pancreas) were
ained. Part of the material was freeze-dried,
ined for endocrine granules, or stained by
direct immunofluorescence using antibodies raised
inst natural CCK and gastrin. The remaining
ples were prepared for immunohistochemistry or
ventional electron microscopy. There were many
ightly fluorescent cells specifically stained for
(in the duodenum and jejunum of all species inves-
gated. Gastrin-secreting cells (G cells) were
en in the antral and upper duodenal mucosa, but
ese cells were infrequent in the remainder of the
all intestine. Comparison of serial 1-μm resin-
bedded sections, stained with antibodies to CCK or
strin, showed that the two peptides were located in
fferent cells. The CCK cells were elongated or
ar shaped with an apical process reaching the
testinal lumen. Their secretory granules were
derately electron dense, with an average diameter
250 nm and a closely attached membrane, making
em similar to the I granules of the modified
esbaden classification. The combination of these
chniques provides a simple and reliable method of
entifying CCK cells in gastrointestinal mucosa.

20 EFFECT OF POSTRADIATION BLEEDING ON PROLIFERATIVE ACTIVITY OF CELLS IN SMALL
TESTINE CRYPTS OF RATS.

(Eng.) Petrovic, N. V.
oris Kidric Inst. Nuclear Sciences, Vinca, Yugo-
avia). *Strahlentherapie* 150(6):585-589; 1975.

e effect of postradiation bleeding on the dynamics
duodenal crypt cell proliferation was studied in
-month-old female rats weighing 170 to 180 g. The
imals were exposed to 800 R (115 R/min) irradia-
ion, immediately after which they were bled by
rdiac puncture to 50% of total blood volume.
rmal animals and animals that had been only bled
only irradiated were used as controls. The
tathmokinetic index of normal rats was 270.6 ± 16.5%.
the first day after irradiation, the indices were
41.5 ± 6.8% in the rats that underwent bleeding
nly and 155.0 ± 9.0% in the rats that underwent
rradiation only. On the third day, the values were
40.0 ± 22.5%, 323.0 ± 9.9%, and 137.0 ± 15.6% in
he bled only, irradiated only, and bled-plus-
rradiated rats, resp. On the fourth day, the
espective values were 195.0 ± 26.0%, 244.0 ± 18.0%,
and 270.0 ± 11.8%. By the fifth day, the indices for the bled and bled-plus-irradiated animals were 179.0 ± 4.6% and 282.0 ± 15.0%, resp. Three days after irradiation, the mean turnover time of duodenal crypt cells in the animals that were irradiated only was extended by over 60%; in irradiated-plus-bled and bled animals, the time was extended by 100%. On the fourth day, the turnover time in irradiated and irradiated-plus-bled animals was almost normal, but was still extended by 30% in the animals that were bled only; similar results were obtained on the fifth day. The results demonstrate that although there were no significant differences in proliferative activity of duodenal epithelial cells in irradiated-plus-bled animals and irradiated animals, the postradiation reparative process in irradiated-plus-bled animals is more stable. It is concluded that bleeding reduced the sensitivity of the epithelium to the radiation by its hypoxic activity; on the other hand, bleeding also removed the damaging agents that appeared as secondary products after total irradiation.

3821 QUANTITATIVE MICROSCOPIC EVALUATION OF THE ENDOPLASMIC RETICULUM IN DEVELOPING HUMAN LIVER.

(Eng.) de la Iglesia, F. A.; Sturgess, J. M.; McGuire, E. J.; Feuer, G. (Warner-Lambert Res. Inst., Sheridan Park, Mississauga, Ontario, 15K 1B4, Canada). *Am. J. Pathol.* 82(1):61-70; 1976.

Sixteen liver biopsies from children 2 months to 18 yr old were analyzed by sterology to study the composition and relative distribution of endoplasmic reticulum membranes within hepatocytes. The histologic aspects of the liver, as well as the clinical laboratory data of these patients, revealed no abnormalities when observed for suspected hepatic ailment. Morphometric analysis of four tissue blocks per biopsy was undertaken by means of combined light and electron microscopy using standard stereologic formulas. There was less endoplasmic reticulum in liver cells from children who were 2-9 months old. These low levels were accounted for by reduced surface of smooth membranes. There was a first-order relationship in the growth of smooth endoplasmic reticulum between 2 months and 4 yr at a rate of 17.1 cm^2/hr, similar to the membrane accumulation rate in experimental animals. Membrane dimensions from Golgi apparatus and rough endoplasmic reticulum were cell-size dependent, and these organelles matured within 2 months of postnatal life. These findings are significant because of the low amounts of smooth endoplasmic reticulum membranes present at an early age. This lack of membrane surface agrees with findings in developing liver of various species. Studies showed reduced membrane population and low microsome-bound enzyme activities, which under normal circumstances, allow the hepatocyte to undertake detoxification and drug metabolizing processes. Thus, the reduced membrane availability of the liver in infants may account for their inability to metabolize foreign compounds.

LIBRARY U. OF I.

3822 SCANNING ELECTRON MICROSCOPY OF MOUSE INTRAHEPATIC STRUCTURES. (Eng.) Nopanitaya, W.; Grisham, J. W. (Univ. North Carolina, Sch. Medicine, Chapel Hill, NC 27514). *Exp. Mol. Pathol.* 23(3):441-458; 1975.

The intrahepatic surface of normal Swiss albino mouse livers, which had been fixed *in situ* by perfusion with paraformaldehyde, was examined by scanning electron microscopy. By fracturing the fixed liver, surfaces of hepatocytes and sinusoidal endothelial cells were exposed; slicing the tissue revealed the internal structures of portal tracts. Hepatic plates were uniformly one cell thick and generally straight, while hepatocytes were polyhedral and sharply angulated. Sinusoids were round to oval in cross section, appearing to be tubes in their longitudinal aspect. Their largest diameter was 20-30 μm. Endothelial cell bodies contained numerous surface pits, which measured 0.05-0.1 μm in diameter. The thinned endothelial cytoplasm contained frequent, small, round fenestrations of about 0.1 μm in diameter, which formed clusters of up to 20 fenestrae. Hepatic arteries were distinguished from portal veins by their smaller size and thicker walls. Arterial endothelial cells were rectangular in shape, with their long axis oriented along the long axis of vessels. In contrast, venous endothelial cells were more nearly round or oval in shape, and were randomly oriented on the luminal surface. Arterial endothelial cell bodies were thicker and more elongated than venous endothelial cells. It is concluded that scanning electron microscopy is useful for the study of intrahepatic surface structures, and may allow further correlations to be made between hepatic structure and function in both healthy and disease states.

3823 ULTRAMICROSCOPIC INVESTIGATIONS OF THE EXOCRINE PANCREAS OF THE DOG AFTER VAGOTOMY. (Eng.) Putzke, H.-P.; Herzog, K. H. (Institut fur Allgemeine und Spezielle Pathologie der Universitat Rostock, DDR-25, Rostock, Strempelstrasse 14, E. Germany). *Exp. Pathol. (Jena)* 11(5/6):270-275; 1975.

The exocrine pancreas of 20 dogs was investigated by electron microscopy before and 3, 4, 10, 11, and 14 days after bilateral truncal vagotomy. Up to the 10th day of the experiment, a disturbance of the secretion of the acinar cells was found, with a sustained increase in enzyme protein synthesizing and lysosomal activity, irregular formation of zymogen granules, and probably continuous extrusion of the enzyme proteins. Distinct irregularities were seen in the formation of the zymogen granules. Numerous secretion granules were evident at all times, but between the 3rd and 10th days, they were frequently derounded or represented miniature forms of mature granules. On the 10th day, immature zymogen granules in the form of homogenous or, less frequently heterogeneous, prozymogen granules predominated. The few mature granules were mostly derounded or appeared as defective forms. On the 11th and 14th days, the zymogen granules were again formed regularly. On the 3rd and 4th days, the epithelial cells of the intercalary ducts showed a moderate hydropic swelling of the ground plasm and large cytoplasmic vacuoles with an inhomogenous content of low density. In addition, membraneously lined cytoplasmic inclusions can be found with partially digestively-changed cytoplasmic structures, which may represent lysosomes. The results show two deviations in the acinar cells, which may indicate a certain impairment of the secretion: an increased cytolysosomal activity and distinct irregularities in the formation of zymogen granules.

3824 POLYPLOIDY IN MOUSE LIVER AFTER REPEATED HEPATECTOMIES. (Rus.) Faktor, V. M.; Uryvaeva, I. V. (Inst. Developmental Biology, USSR Acad. Sciences, Moscow, USSR). *Tsitologiia* 17(8): 909-916; 1975.

3825 ENDOCRINE CELLS OF THE GASTROINTESTINAL TRACT IN NORMALCY AND PATHOLOGY. (Rus.) Aruin, L. I. (Inst. Medical Genetics, USSR Acad. Medical Sciences, Moscow, USSR). *Klin. Med. (Mosk.)* 53(1):41-45; 1975.

3826 IMMUNOCYTOCHEMICAL IDENTIFICATION OF GLUCAGON-SECRETING CELLS IN THE GASTRIC MUCOSA. (Fre.) Baetens, D.; Rufener, C.; Unger, H.; Renold, A. E.; Orci, L. (Institut d'Histologie et d'Embryologie, Ecole de Medecine, 1211 Geneva 4, Switzerland). *C. R. Acad. Sci.* [*D*] *(Paris)* 282(2):195-197; 1976.

3827 PLASMALEMMA OF HEPATOCYTES IN MICE OF DIFFERENT AGES: FINE STRUCTURAL STUDY AFTER ISOLATION; MEASUREMENT OF THE 5'-NUCLEOTIDASE ACTIVITY. (Fre.) Montmory, E.; Bourges, M. (Laboratoire d'Histologie-Embryologie-Cytogenetique, Faculte de Medecine, B.P. n^0 38, 63001 Clermont-Ferrand, France). *C. R. Acad. Sci.* [*D*] *(Paris)* 281(18):1333-1336; 1975.

3828 PARTICLES ASSOCIATED WITH MICROVILLOUS BORDER OF INTESTINAL MUCOSA [Letter to Editor]. (Eng.) Chandler, R. L.; Bird, R. G.; Bland, A. P. (Inst. Research Animal Diseases, Compton, Newbury, Berks, England). *Lancet* 2(7943):931-932; 1975.

3829 TIME OF RENEWAL, PROLIFERATIVE POOL AND DURATION OF MITOTIC CYCLE OF THE COMMON BILE DUCT EPITHELIUM CELLS. (Rus.) Dyban, P. A. (Inst. Experimental Medicine, USSR Acad. Medical Sciences, Leningrad, USSR). *Biull. Eksp. Biol. Med.* 80(9):93-94; 1975.

3830 ELECTRON MICROSCOPE STUDIES OF Shigellae INTERACTION WITH CELL CULTURE. II. THE STRUCTURAL-FUNCTIONAL REACTION OF THE MAIN CYTOPLASMIC ORGANOIDS OF THE INFECTED CELL. (Rus.) Nosova, L. S.; Zhdanov, E. E.; Trofimova, M. N. (Inst. Epidemiology and Microbiology, Gorki, USSR). *Tsitologiia* 17(8):965-970; 1975.

3831 CYTOPLASMIC CISTERNS STRUCTURALLY ASSOCIATED WITH PLASMOLEMMA IN HEPATOCYTES OF DIFFERENT MICE STRAINS. (Rus.) Shkurupii, V. A. (Novosibirsk Medical Inst., Novosibirsk, USSR). *Tsitologiia* 17(8):985-987; 1975.

3832 MORPHOLOGICAL PECULIARITIES OF THE HEALING OF HISTAMINIC ULCERS UNDER THE EFFECT OF DEOXYCORTICOSTERONE. (Rus.) Liashko, N. A.; Mel'nik, L. A.; Kosenko, A. E. (Kiev Medical Inst., Kiev, USSR). *Vrach. Delo* (9):47-51; 1975.

3833 PARACRYSTALLIC, INTRAPLASMATIC INCLUSION BODIES IN HUMAN HEPATOCYTES. A STRUCTURAL ANALYTIC STUDY. (Ger.) Nemetschek-Gansler, H.; Nemetschek, Th. (Pathologisches Institut der Universitat, D-6900 Heidelberg, Im Neuenheimer Feld 220-221, W. Germany). *Virchows Arch. [Pathol. Anat.].* 369(1):45-53; 1975.

3834 BLOOD SUPPLY AND HISTOPHYSIOLOGY OF THE APPENDICES EPIPLOICAE. (Ger.) Hansen, H. H.; Heine, H. (Universitats-Klinikum, D-6000 Frankfurt a. M., Theodor Stern-Kai 7, W. Germany). *Langenbecks Arch. Chir.* 340(3):191-197; 1976.

3835 ESTIMATION OF MAST CELL CONTENT IN THE DIGESTIVE TRACT ORGANS OF RATS AND FROGS. (Rus.) Zakharov, M. K.; Bogach, V. V. (Khabarovsk Medical Inst., Khabarovsk, USSR). *Biull. Eksp. Biol. Med.* 81(1):94-95; 1976.

3836 NEW DATA ON THE STRUCTURE OF THE CRYPTAL REGION OF THE SMALL INTESTINAL MUCOSA IN RODENTS AND DOGS. (Rus.) Parshkov, E. M. (Scientific Research Inst. Medical Radiology, USSR Acad. Medical Sciences, Obninsk, USSR). *Dokl. Akad. Nauk SSSR* 228(3):717-719; 1976.

3837 LIGHT AND ELECTRON MICROSCOPIC EXAMINATIONS OF THE GASTROINTESTINAL TRACT OF RATS FOLLOWING ORAL ADMINISTRATION OF CHENODEOXYCHOLIC ACID. (Ger.) Leuschner, U.; Neuenfeldt, H. U. (Zentrum der Inneren Medizin, Johann-Wolfgang-Goether-Universitat, 6000 Frankfurt/M., Theodor-Stern-Kai 7, W. Germany). *Z. Gastroenterol.* 13(7):648-653; 1975.

3838 THE MORPHOLOGICAL BASIS OF FATTY ACID INDUCED INTESTINAL SECRETION [Abstract]. (Eng.) Lorenzsonn, V.; Cline, W.; Benz, L.; Olsen, W. (Veterans Admin. Hosp., Madison, WI). *J. Cell Biol.* 67:248a; 1975.

See also, 3869, 3948, 3981, 4185.

ABSORPTION - EXCRETION - TRANSPORT

3839 A METHOD FOR THE CONTINUOUS STUDY OF NET WATER TRANSPORT IN THE FELINE SMALL BOWEL. (Eng.) Jodal, M.; Hallback, D.-A.; Svanvik, J.; Lundgren, O. (Dept. Physiology, Univ. Goteborg, Sweden). *Acta Physiol. Scand.* 95(4):441-447; 1975.

A new perfusion technique for the study of net water transport across the intestinal epithelium *in vivo* is described. The lumen of an isolated segment of feline small bowel is steadily perfused with a solution of known composition, in a closed perfusion system, with a reservoir large enough to prevent recirculation. The intestinal segment may be enclosed in a plethysmograph. Changes in the perfused volume are recorded by a volume transducer coupled to the recirculating system via a T-tube. If no motility occurs, the changes of the perfusion volume reflect net water transport across the intestinal epithelium. A quantitative comparison of this technique with the conventional polyethylene glycol method revealed no significant difference. The plethysmographic method also makes it possible to quantify the net water absorption via lymph and blood and to study bidirectional fluxes of water or other easily followed substances, by the addition of proper tracers.

3840 MUCOSAL IRON RETENTION AND PLASMA IRON ABSORPTION IN THE DUODENUM AND JEJUNUM OF DOGS. (Eng.) Christophersen, E. B.; Balcerzak, S. P. (Kirurgisk avdeling A, Rikshospitalet, Pilestredet 32, Oslo, Norway). *Scand. J. Gastroenterol.* 11(4):397-402; 1976.

To gain further information about iron absorption in the duodenum and jejunum, experiments employing ^{55}Fe and ^{59}Fe and a new, simplified surgical method for constructing temporary isolated intestinal segments were performed in dogs. Two groups of non-anemic dogs, one with normal tissue iron stores and one with decreased tissue iron stores, underwent the procedure. A nontraumatic vascular clamp was placed proximally across the duodenum distal to the point at which the biliary and pancreatic ducts enter the intestine. A second clamp was placed distally across the duodenum close to the ligament of Treitz. A segment of jejunum was then isolated in a similar fashion. The proximal portion of the jejunal segment was separated from the distal division of the duodenal segment by a distance of twice the length of the respective isolated segments. A double purse-string suture was placed on the antimesenteric border at the distal portion of the isolated duodenal and jejunal segments. A solution of 0.1 mg of ferrous sulfate and 1 mg of ascorbic acid was injected through silastic tubing into the lumen of each segment. The solution for the duodenal segment contained 30 µCi ^{59}Fe, and for the jejunal segment, 60 µCi ^{55}Fe. The solutions were left in the segments for 2.5 hr before washout. On the 14th postoperative day, ^{59}Fe and ^{55}Fe radioactivity per milliliter per RBC was measured, and iron uptake by segments was determined. In three dogs with normal iron stores in the bone marrow, liver, and spleen, the retained iron was slightly higher in the jejunum (mean, 10.8%) than in the duodenum (6.2%). In five dogs with decreased iron stores, the percentage of retention was always higher in the duodenum (25.1% in duodenum and 18.2% in jejunum), and the iron retained was about four times higher than in dogs with normal iron stores. This indicates that mucosal uptake of iron from the lumen and mucosal transfer of iron from plasma vary inversely with body iron stores, but compared to mucosal uptake, mucosal transfer is more restricted to the duodenum, more affected by body iron stores, more limited, and more crucial to regulation of iron absorption.

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3841 RESISTANCE OF INTESTINAL TRIGLYCERIDE TRANSPORT CAPACITY IN THE RAT TO ADAPTATION TO ALTERED LUMINAL ENVIRONMENT.

(Eng.) Wu, A.-L.; Clark, S. B. (Massachusetts General Hosp., Boston, MA). *Am. J. Clin. Nutr.* 29(2):157-168; 1976.

The effects of altered luminal conditions on the relative capacities for [^{14}C]triolein transport through different regions of the intestinal wall were examined in male Wistar rats. The fat-releasing capacities of the proximal and distal small intestine were controlled by using substrate induction and surgical manipulation to alter the luminal environment *in vivo*. The regional mucosal lipid accumulation found after 3 hr of maximal steady-state triolein absorption was used as an index of the transmucosal lipid transport capacities of different regions of the intestine. The high ^{14}C-lipid accumulation in distal mucosa was not reduced after direct distal infusion of oleic acid and monolein (2:1, v/v) for 7 days before challenge. No decrease in distal intestinal lipid accumulation was found 1 month after removal of the proximal 40% of the intestine beyond the duodenum. Conversely, alteration of the luminal environment in the proximal intestine by 3 days of starvation or by ileal resection did not increase the tissue ^{14}C-lipid concentration in this region during maximal [^{14}C]triolein challenge. When proximal and distal segments were exchanged by jejuno-ileal transposition without reduction in intestinal length, major ^{14}C-lipid accumulation still occurred in originally-distal segments during [^{14}C]triolein infusion 1 month later. The triolein absorption rate was about 35% lower in animals receiving atropine infusions (0.24 mg/hr) than in controls ($p<0.01$). The results confirm that distal intestinal mucosa accumulates large amounts of triglyceride when exposed to high concentrations of fat in the lumen. An intrinsic difference may exist in the capacity for chylomicron synthesis or secretion by the proximal and distal intestine, at least in the rat.

3842 THE EFFECTS OF CORTICOSTERONE AND CORTISONE ON THE UPTAKE OF POLYVINYL PYRROLIDONE AND THE TRANSMISSION OF IMMUNOGLOBULIN G BY THE SMALL INTESTINE IN YOUNG RATS.

(Eng.) Morris, B.; Morris, R. (Dept. Zoology, Univ. Nottingham, Nottingham NG7 2RD, England). *J. Physiol. (Lond.)* 254(2):389-403; 1976.

The effects of 5 mg corticosterone and 5 mg cortisone on the uptake of polyvinyl pyrrolidone (PVP) and the transmission of immunoglobulin (Ig) by the small intestine were investigated in young Wistar rats. Rats underwent two surgical procedures: a ligature was tied around the pyloric sphincter and 0.1 ml of a labeled rat IgG (0.5 mg) preparation was injected into the duodenum distal to the ligature; and a ligature was tied 9-12 cm from the ileocecal junction and 0.1 ml of PVP preparation (20 mg/ml solution containing 0.25-0.5 µCi/^{125}I/ml) was injected into the gut distal to the ligature. The distribution of PVP along the intestinal lumen and in the intestinal wall, following p.o. administration to normal and corticosterone-treated rats, was extremely variable. Valid comparisons between the two groups of animals were not observed using this technique. Three, 4, and 5 days after corticosterone treatment, there was no significant change in the uptake of ^{125}I-labeled PVP from standard doses injected into ligated segments of the distal small intestine, nor did the treatment induce precocious replacement of the absorptive cells in this region. Cortisone-induced precocious cell replacement, a process that took up to 4 days to complete, also led to a marked reduction ($p<0.001$) in the uptake of ^{125}I-labeled PVP from ligated segments of the distal intestine. Three days after treatment with corticosterone (5 mg, i.p., at 12 days of age), there was a marked reduction ($p<0.001$) of labeled IgG transport into the blood. Four and 5 days after treatment, there was some recovery of the IgG transport function. Three days after treatment with cortisone, there was closure of the gut to labeled IgG. The results show that cortisone injection leads to a precocious change of cell type in the distal intestine and to a dramatic fall in PVP uptake.

3843 STIMULATION OF VITAMIN D-DEPENDENT Ca-ATPase AND OF INTESTINAL CALCIUM ABSORPTION BY DIPHENYLHYDANTOIN.

(Eng.) De Wolff, F. A. (Dept. Pharmacology, Univ. Leiden, Wassenaarseweg 72, Leiden, Netherlands). *Eur. J. Pharmacol.* 33: 71-79; 1975.

The effects of diphenylhydantoin (DPH) and ouabain were studied *in vitro* on Mg-ATPase, Ca-ATPase, and alkaline phosphatase (AlPase) in isolated brush borders from rat jejunum and *in vivo* on intestinal calcium absorption in vitamin D-deficient, D-repleted, and normal Wistar rats. In enzyme studies in isolated brush borders, Mg-ATPase was not significantly affected by vitamin D deficiency or DPH. Vitamin D repletion (1,000 IU vitamin D_3) of deficient animals enhanced Ca-ATPase activity by 100% ($p<0.001$) and partially restored AlPase activity. Concentrations of 10^{-4} M DPH had a highly stimulating effect on the activity of Ca-ATPase. In both deficient and repleted rats, this stimulation was 2.5 times that of controls ($p<0.01$). In one group of deficient and repleted rats, a large stimulation of Ca-ATPase activity was found following 10^{-3} M ouabain, but this effect could not be reproduced. In Ca *in vivo* absorption studies, repletion resulted in a significant enhancement of Ca absorption ($p<0.05$), which was most pronounced in the presence of DPH. Increased levels of Ca-absorption were significantly higher than in normal rats ($p<0.001$). The addition of 10^{-4} M DPH to the perfusion fluid resulted in a significant enhancement of Ca absorption in all three groups of animals ($p<0.005$). It is concluded that there is a striking parallel between Ca absorption and Ca-ATPase in response to vitamin D and to DPH. It is likely that Ca-ATPase and not AlPase is involved in the transport of Ca through the microvillous membrane, and that DPH enhances Ca absorption by activation of Ca-ATPase.

3844 EFFECTS OF NEOMYCIN ON SUGAR TRANSPORT IN THE SMALL INTESTINE OF RATS AND HAMSTERS. (Spa.) Rull, S.; Ponz, F. (Facultad Ciencias, Universidad Navarra, Pamplona, Spain). *Rev. Esp. Fisiol.* 30(3):183-190; 1974.

The effect of different concentrations of neomycin B (as a free base) on the intestinal absorption of sugars (in isotonic saline solution) was studied *in vivo* in adult, white Wistar rats and Syrian hamsters. The absorption of 2.77 mM galactose and 50 mM D-arabinose (evaluated as μM of sugars absorbed/cm of small intestine) in rats was significantly increased when neomycin (6 or 18 mM) was added to the sugar solutions, while a 6 mM solution of neomycin also increased the absorption of 2.77 mM glucose. The effects disappeared after washing the intestine with saline solution. The absorption of 2.77 mM glucose was significantly inhibited by 18 mM neomycin; this inhibition persisted after intestinal washing, probably indicating lasting cellular alterations induced by the higher concentration of neomycin. In small concentrations (0.8 and 1.5 mM), the neomycin had no effect on the absorption of glucose or galactose. Neomycin (18 mM) had no effect on the absorption of glucose in hamsters. *In vitro* experiments showed that neomycin (5 mM) had no significant effect on the active transport of glucose by everted intestinal villi of the rat or intestinal rings of the hamsters. Oxygen consumption by rat intestinal rings incubated for 60 min with or without 2.77 mM glucose was not affected by the presence of neomycin. Morphological changes, including marked desquamation, flattening of the intestinal villi, and inflammatory infiltration of the proper mucous membrane were observed in the intestinal epithelium of the rat, but not in that of the hamster. The authors conclude that the increased *in vivo* absorption of sugar in rats was caused by the action of neomycin, which increased the permeability of the luminal membrane regardless of the transport systems.

3845 THE EFFECTS OF REMOVAL OF SODIUM IONS FROM THE MUCOSAL SOLUTION ON SUGAR ABSORPTION BY RABBIT ILEUM. (Eng.) Naftalin, R. J.; Holman, G. D. (Dept. Physiology, Kings Coll., London, England). *Biochim. Biophys. Acta* 419(2):385-390; 1976.

The effects of mucosal deprivation of Na^+ on the absorption of labeled 3-*O*-methyl glucose at both high (20 mM) and low (2 mM) concentrations, and on D-galactose (2 mM) and β-methyl-D-glucose (1 mM) transport by sheets of New Zealand rabbit ileum were investigated. Fluxes of sugars were measured at intervals after addition of radioisotopes (^3H, ^{14}C) to a mucosal solution containing 140 mEq Na^+. The terminal ileum was dissected and stripped of its serosa and outer muscle layers before mounting as a flat sheet in the flux chambers. The removal of Na^+ from the mucosal solution alone caused a significant reduction in mucosal-serosal (m-s) flux of all sugars. The ratios of $^3H/^{14}C$-labeled sugar entering the tissue from the m-s solutions were all reduced by replacement of mucosal Na^+ by choline. Except in the case of 3-*O*-methyl glucose, removal of mucosal Na^+ increased the m-s sugar fluxes. Removal of Na^+ from both m-s solutions caused a further significant decrease in J_{ms} and net flux in all conditions, except with 3-*O*-methyl glucose, and reductions in tissue accumulation and the specific activity ratio occurred in all conditions. There was a further increase in m-s fluxes of ^{14}C-labeled sugars in all cases when Na^+ was removed from both serosal and mucosal solutions, compared with the effect of unilateral removal of Na^+ from the mucosal solution. The results indicate that, except with 3-*O*-methyl glucose, when the normal Na^+ gradient is reversed, significant net sugar transport against the direction of the Na^+ gradient remains. Although the presence of Na^+ in the mucosal solution accelerates sugar influx across the brush border, it is not essential for net sugar absorption and accumulation by the small intestine.

3846 THE HYDROLYSIS AND ABSORPTION OF CONJUGATED FOLATES IN MAN. (Eng.) Jagerstad, M.; Dencker, H.; Westesson, A.-K. (Lab. Res. Clinical Hematology, Lund, Sweden). *Scand. J. Gastroenterol.* 11(3):283-287; 1976.

The distribution and activity of pteroylpolyglutamate (PPG)-hydrolase in the human gastrointestinal tract and the absorption of synthetic triglutamic folate were investigated in four patients who had been radically operated upon for cancer of the large bowel 1 yr previously. The patients were given either 1 or 2 μmol pteroyltriglutamic acid. Plasma conjugase from vena portae blood was inhibited by rapid heat denaturation. The folate forms were assayed with *Lactobacillus casei* and *Streptococcus faecalis* and were identified by thin layer chromatography. Mono- and diglutamic folate were demonstrated in the portal plasma. The PPG-hydrolyzing activity was found in the gastric juice, the intestinal juice, the pancreatic juice, and the intestinal mucosa. The highest activity, expressed as μg pteroyldiglutamate ($PteGlu_2$) and/or pteroyl monoglutamate ($PteGlu_1$) released/mg protein within 10 min, was found in the pancreatic juice. The pH optimum was a very low 3 for gastric and intestinal juice and 4.5 for pancreatic juice. The intestinal mucosa was analyzed only at pH 5.0. At pH 6, PPG-hydrolase activity of pancreatic juice was 0.07 μg PteGlu$_2$ and/or PteGlu$_1$ released/min/mg protein. In view of the volumes of these fluids produced every day, the activity at physiological pH might be enough to hydrolyze the daily intake of conjugated folates in amounts of about 500 μg.

3847 THE EFFECT OF PROTEIN DEFICIENCY ON ZINC ABSORPTION FROM THE SMALL INTESTINE AND ZINC AND COPPER CONTENTS OF RAT ORGANS. (Pol.) Kwast, M. (Panstwowy Zaklad Higieny, 00-791 Warsaw, ul. Chocimska 24, Poland). *Rocz. Panstw. Zakl. Hig.* 26(4):471-477; 1975.

3848 ABSORPTION OF MANGANESE COMPLEXES WITH AMINO ACIDS IN THE SMALL INTESTINE. (Rus.) Faitel'berg, R. O.; Ermakova, T. A. (I. I. Mechnikov Odessa State Univ., Odessa, USSR). *Fiziol. Zh. SSSR* 61(9):1415-1420; 1975.

3849 COMPARATIVE STUDY OF INTESTINAL ABSORPTION USING TRIOLEIN LABELED WITH ^{131}I OR ^{14}C. (Fre.) Dauchel, J.; Kachelhoffer, J.; Mendel, C.; Eloy, M. R.; Grenier, J. F. (Hospices Civils, F-67005 Strasbourg Cedex, France). *Acta Gastroenterol. Belg.* 38(9/10):299-313; 1975.

3850 ACTIVE TRANSPORT MECHANISMS OF THE SMALL INTESTINAL MUCOSA AND ITS FUNCTIONAL DISTURBANCES. (Ger.) Riecken, E. O. (Evangelische Diakonissenanstalt Bremen-Krankenhaus, Groepelinger Heerstrasse 406-408, D-2800 Bremen 21, W. Germany). *Z. Gastroenterol.* 14(3):407-419; 1976.

See also, 3893, 4536.

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MOTILITY

3851 CORRELATION OF CONTRACTIONS AND TRANSIT IN RAT SMALL INTESTINE. (Eng.) Scott, L. D.; Summers, R. W. (Dept. Internal Medicine, Univ. Iowa, Iowa City, IA 52242). *Am. J. Physiol.* 230(1):132-137; 1976.

Experiments were designed to define the pattern of contractions, to measure net transit in the rat small intestine under fasting conditions, and to examine the effects of glucagon and cerulein on contractions, water movement, and net flow. A single strain gauge was implanted chronically in the proximal jejunum of male Sprague-Dawley rats to record contractions. Fasted pentobarbital-anesthetized animals received glucagon, cerulein, or isotonic saline control infusions i.v. while contractions were recorded. In control animals, the distribution of contractions in time showed clusters with peaks at intervals of 14.24 ± 5.6 (SD) min. Glucagon produced dose-related inhibition of contractions; the inhibition apparently being complete at 100 mg/kg/min. Cerulein, at two lower doses (0.001 and 0.01 μg/kg/min), produced a more uniform distribution of contractions in time; a higher dose (1.0 μg/kg/min) caused inhibition. In other fasted rats, an isotonically labeled bolus was given through a chronically implanted duodenal catheter, and its distribution along the small intestine was examined in animals receiving the same doses of glucagon, cerulein, and saline. Glucagon caused a dose-related delay in transit. Those doses of cerulein that produced a uniform distribution of contractions accelerated transit; the dose that inhibited contractions delayed transit. Doses of glucagon and cerulein known to affect both motility and transit did not significantly affect water movement. It is concluded that the fasted rat resembles the fasted dog in respect to the temporal distributions of jejunal contractions at a single point. Both quantitative and qualitative changes in contractions induce changes in transit.

3852 IS GASTRIN A MAJOR DETERMINANT OF BASAL LOWER ESOPHAGEAL SPHINCTER PRESSURE? A DOUBLE-BLIND CONTROLLED STUDY USING HIGH TITER GASTRIN ANTISERUM. (Eng.) Goyal, R. K.; McGuigan, J. E. (Southwestern Medical Sch., Dallas, TX 75235). *J. Clin. Invest.* 57(2):291-300; 1976.

The influence of binding of circulating gastrin with a high titer gastrin antiserum on lower esophageal sphincter pressure was studied in anesthetized oppossums. Gastrin antiserum or control antiserum was administered i.v. in successive doses of 0.02, 0.1, and 0.5 ml/kg on separate days. The lower esophageal sphincter pressures were measured for 1 hr before and for 1 hr after antiserum administration. The control serum caused no binding of opossum circulating gastrin, nor did it modify lower esophageal sphincter pressure. The administration of gastrin antiserum resulted in the binding of 85-90% of circulating gastrin, but it did not reduce sphincter pressure. A continuous infusion of 0.25 μg/kg/hr of synthetic human gastrin I caused a significant ($p<0.05$) increase in the sphincter pressure, a 30-fold increase in gastric acid output, and a 4-fold increase in immunoreactive gastrin in the blood. Prior treatment with 0.1 ml/kg of gastrin antiserum antagonized and 0.2 ml/kg of the antiserum abolished the gastrin-stimulated gastric acid secretion and the stimulating effect of gastrin on lower esophageal sphincter pressure. However, neither dose of antiserum modified basal lower esophageal sphincter pressure. It is concluded that circulating gastrin ıy not be an important determinant of basal sphinc- ɛr pressure.

353 THE EFFECT OF SECRETIN AND CHOLECYSTOKININ ON THE DUODENAL MOTILITY IN MAN.

(Eng.) snes, M. (Ulleval Hosp., Oslo 1, Norway). *Scand. . Gastroenterol.* 10(Suppl. 35):22-25; 1975.

new electrical intraluminal transducer was used to kamine the intraluminal duodenal pressure variations ıring the infusion of natural or synthetic secretin l IU/kg/hr) and 25% cholecystokinin (1 IU/kg/hr). hree transducers were coupled together, 7.5 cm from ach other, and introduced p.o. They were placed in he duodenal bulb, in the descending duodenum, and n the lower duodenal knee. Both synthetic and atural secretin inhibited the duodenal pressure ctivity in six healthy subjects, as compared to hat observed during control infusions of saline. holecystokinin had no significant effect on duodenal ressure, and rhythmic contractions were not seen uring this infusion.

354 13-NORLEUCINE MOTILIN VERSUS PENTAGASTRIN: CONTRASTING AND COMPETITIVE EFFECTS ON ASTROINTESTINAL MYOELECTRICAL ACTIVITY IN THE ONSCIOUS DOG.

(Eng.) Wingate, D. L.; Ruppin, H.; hompson, H. H.; Green, W. E. R.; Domschke, W.; unsch, E.; Demling, L.; Ritchie, H. D. (London osp. Medical Coll., London, England). *Acta Hepato- astroenterol. (Stuttg.)* 22(6):409-410; 1975.

he effect of 13-norleucine motilin (13-Nle-M, .4 μg/kg/hr) infusion on the *in vivo* electric otor activity of the stomach and small intestine as studied in three, conscious, fasted dogs. The nimals were previously prepared with eight uni- olar silver-silver chloride electrodes sutured to he serosa of the stomach, duodenum, jejunum, nd ileum. Typical aborally-propagated interdiges- ive myoelectric complexes were induced by the nfusion. The administration of pentagastrin 2.0 μg/kg/hr, i.v.) disrupted the regular inter- igestive activity and induced the typical constant attern of continuous moderate spike activity at ll recording sites. In contrast, 13-Nle-M evoked ronts of action potentials similar to the spontane- us interdigestive complex, starting in the antrum nd proximal duodenum and slowly migrating along the mall intestine to the terminal ileum in 60-80 min. imultaneous infusion of 13-Nle-M and pentagastrin aused no striking differences from electrical motor ctivity induced by pentagastrin alone. The results rovide further evidence that motilin as well as astrin may be involved in the control of gastro- ntestinal motility in dogs.

3855 THE EFFECT OF METOCLOPRAMIDE ON INTESTINAL MUSCLE RESPONSES AND THE PERISTALTIC REFLEX IN VITRO.

(Eng.) Okwuasaba, F. K.; Hamilton, J. T. (Dept. Pharmacology, Univ. Western Ontario, London, Ontario, Canada N6A 5C1). *Can. J. Physiol. Pharmacol.* 54(3):393-404; 1976.

The effect of metoclopramide (Mcp) on intestinal muscle responses and the *in vitro* peristaltic reflex was investigated in the guinea pig ileum and taenia coli, in the rabbit ileum, and in the rat duodenum. Smooth muscle preparations were mounted in an organ bath prior to drug exposure. The addition of Mcp (0.1-1.0 μM) increased ($p<0.001$) the tone and responses of the tissues to acetylcholine, carbachol, and nicotine; it had no effect on tissue responses to histamine, potassium chloride, and prostaglandin E_1. Responses to 5-hydroxytryptamine (5-HT) were decreased. Hexamethonium (50.0 μM), mepyramine (1.0 μM), and indomethacin (84.0 μM) had no significant effect on the responses to Mcp. Atropine (0.1 μM) partially and significantly inhibited the stimulatory action of Mcp by 70-75% and completely abolished the contractile responses to acetylcholine (0.01-0.60 μM). Methysergide (1.0 μM) produced a partial blockage (15-25%) of responses to Mcp, but did not abolish the response to 5-HT (0.01-0.60 μM). Tetrodotoxin (0.1 μM) produced a partial (70-75%), but significant ($p<0.001$), blockage of responses to Mcp. Similar results (60-70% inhibition) were obtained with morphine (50.0 μM). Metoclopramide (1.0 μM) lowered the threshold of the peristaltic reflex to a subthreshold intraluminal pressure (2.5 cm H_2O), facilitated the peristaltic response to threshold pressures (3-4 cm H_2O), and restored the reflex in fatigued preparations, but not in those depressed by cooling to 24 C. During blockage of peristalsis by atropine, hexamethonium, or methysergide (applied serosally), 5-HT (0.25 μM), but not Mcp (1.0 μM), effectively restored the peristaltic reflex. Neither antagonized the inhibition by morphine or procaine acting serosally. These results do not support the hypothesis that the stimulatory action of Mcp is entirely dependent on either peripheral sensitization of muscarinic receptors or an action on tryptaminergic mechanisms, and are consistent with the authors' previously published conclusion that an additional component may be a blockade of some intrinsic inhibitory substance normally restraining intestinal motility or tone.

3856 THE SIGNIFICANCE OF DISTENTION FOR THE EFFECT OF GLUCAGON ON THE FUNDIC AND ANTRAL MOTILITY IN ISOLATED GUINEA-PIG STOMACH.

(Eng.) Gerner, T.; Haffner, J. F. W. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 10(Suppl. 35): 51-53; 1975.

Experiments were conducted to determine the *in vitro* effect of glucagon on antral and fundal motility of the guinea pig stomach and to determine whether the effect of glucagon is related to the degree of distention of the antrum and fundus. The pressure in the isolated antrum and fundus was recorded with fluid-filled balloons connected to transducers; the balloon volumes were increased stepwise, until the pressure was approximately 15 cm H_2O. Glucagon (10 μg/ml) were added at each step of distension in eight preparations, and the motility recordings were compared with those from nine control preparations not exposed to glucagon. Glucagon inhibited gastric motility in both parts of the stomach. The inhibitory effect on antral motility was obtained only

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when the pouches were maximally distended. This inhibitory effect was not related to the degree of distention in the fundus, but the reduction in basal pressure was markedly enhanced by distention. It is concluded that glucagon has a direct inhibitory effect on gastric motility *in vitro;* this effect is most marked in the fundus and most easily elicited in distended preparations.

3857 ACTION OF COHERIN ON THE BASIC ELECTRICAL RHYTHM AND PROPAGATION IN THE ISOLATED PERFUSED CANINE JEJUNUM. (Eng.) Mendel, C.; Jaeck, D.; Grenier, J. F.; Hiatt, R. B.; Goodman, I.; Sandler, B. (Univ. Medical Sch., INSERM, Avenue Moliere, Strasbourg, Hautepierre, France). *J. Surg. Res.* 19(6):403-409; 1975.

The action of coherin on the basic electrical rhythm (BER) and propagation in the isolated perfused canine jejunum was investigated *in vitro* in six mongrel dogs. Six silver-silver chloride punctate wire electrodes were inserted into the longitudinal muscle of the jejunum. Simultaneous electroenterogram (ENG) recordings were made from the electrodes. Pre- and postinjection (250 ng coherin) ENG recordings were made. There was an average gain in coherence by a factor of 3 following injection of coherin ($p<0.0005$). A post-coherin ENG using another preparation recorded 1 hr after the coherin injection showed that the coherence index was 56%, up from 20% in the pre-coherin base period. The average BER frequency was 13.8 cycles/min. The highest degree of coherence was a 73% coherence index obtained 41 min after injection of another preparation. Coherin, a peptide of the neurohypophysis, acts to regulate the propagative characteristics of the jejunal BER without intervention of extrinsic neutral or humoral factors.

3858 THE EFFECT OF ACTH, CORTISONE AND DEOXYCORTICOSTERONE ON THE EVACUATION OF STOMACH IN RATS. (Slo.) Visnovsky, P. (Ustav farmakologie LFUK, Partizanska 19, 037 53 Martin, Czechoslovakia). *Bratisl. Lek. Listy* 64(1):25-29; 1975.

3859 METHOD FOR THE STUDY OF THE INTESTINAL TONUS IN THE DOG. PRELIMINARY RESULTS. (Fre.) Putz, Ph.; Bremer, A. (Clinique Chirurgicale Hopital St. Pierre, 322, rue Haute, 1000 Brussels, Belgium). *Arch. Int. Physiol. Biochim.* 83(4):783-788; 1975.

3860 GASTRIC MOTILITY AND ITS REGULATION. (Slo.) Visnovsky, P. (Katedra patologicke fyziologie a farmakologie Lekarskej fakulty UK, 037 53 Martin, Partizanska 19, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 29(7):477-483; 1975.

3861 HOW JUSTIFIED IS THE "EXPONENTIAL FITTING" OF THE GASTRIC EMPTYING CURVE? (Ger.) Aeberhard, P.; Goldinger, G.; Roesler, H.; Noelp, H. (Universitatsklinik fur viszerale Chirurgie, Inselspital, CH-3010 Bern, Switzerland). *Schweiz. Med. Wochenschr.* 106(9):300-302; 1976.

3862 THE CHARACTER OF ELECTRICAL ACTIVITY IN THE N. VAGUS UNDER THE EFFECT OF HIGH EXTERNAL TEMPERATURE ON THE ORGANISM. (Rus.) Denis senko, P. P.; Makhsumov, M. N. (Leningrad Inst. Hygiene and Sanitation, Leningrad, USSR). *Fiziol. Zh. SSSR* 61(9):1367-1372; 1975.

3863 THE EFFECT OF THYROCALCITONIN ON THE PERIODIC MOTOR ACTIVITY OF THE GASTROINTESTINAL TRACT. (Rus.) Lebedev, N. N.; Briskin, A. I. (Inst. General Pathology and Pathophysiology, USSR Acad. Medical Sciences, Moscow, USSR). *Biull. Eksp. Biol. Med.* 80(9):10-12; 1975.

See also, 4245, 4268.

SECRETION AND METABOLISM

3864 PROLONGED ETHANOL CONSUMPTION INCREASES TESTOSTERONE METABOLISM IN THE LIVER. (Eng.) Rubin, E.; Lieber, C. S.; Altman, K.; Gordon, G. G.; Southern, A. L. (Mt. Sinai Sch. Medicine, New York, NY 10029). *Science* 191(4227): 563-564; 1976.

The effect of ethanol on hepatic testosterone reductase activity was studied in 16 male Sprague-Dawley rats, in three nonalcoholic men, and in two chronic alcoholics. Each of the rats was paired with anothe animal, one being fed a nutritionally adequate diet containing 36% carbohydrate, and the other being fed a similar diet in which ethanol was isocalorically substituted for carbohydrate. The animals were killed after 24 days. The mean activity of testosterone reductase in the microsomal fraction was more than doubled, while that in the soluble fraction was essentially unchanged. All five human subjects were given a diet containing excess protein, vitamins, minerals, and approximately 3 g/kg/day ethanol for 4 weeks. The reductase activity, which was measured in whole homogenates of aspiration liver biopsy specimens before and after ethanol administration, was augmented between two- and fivefold after ethanol administration. An increase in the activity of testosterone reductase may enhance the removal of testosterone and other Δ^4-3-ketosteroids in the liver, which, in turn, may play a role in the reduced androgenic activity found in chronic alcoholics.

3865 GASTRIC INHIBITORY POLYPEPTIDE (GIP) STIMULATED BY FAT INGESTION IN MAN. (Eng.) Falko, J. M.; Crockett, S. E.; Cataland, S.; Mazzaferri, E. L. (Dept. Medicine, Ohio State Univ., Columbus, OH 43210). *J. Clin. Endocrinol. Metab.* 41(2):260-265; 1975.

The immunoreactive gastric inhibitory polypeptide (GIP), insulin (IRI), and nonesterified fatty acid (NEFA) responses were measured in 10 normal subjects who ingested emulsified corn oil (67 g Lipomul). Serum GIP levels rose after the ingestion of corn oil in all subjects, increasing from a mean fasting level of 272 pg/ml to 856 ± 272 pg/ml ($p<0.05$) by 30 min. The peak mean serum GIP concentration of 1,345 ± 291 pg/ml occurred at 60 min; and mean serum GIP levels at 180 min remained significantly elevated over fasting values. Serum IRI, glucose, and NEFA concentrations did not change during the 180 min of study. No changes in serum GIP concentrations occurred when, for control purposes, six volunteers ingested 100 ml of water on another day. It is concluded that fat is a potent stimulus for the release of GIP in normal individuals, and that endogenously released GIP is not insulinotropic under the conditions of this study.

3866 LOCALIZATION OF ALKALINE PHOSPHATASE AND DEHYDROGENASES IN THE PROCESS OF DIFFERENTIATION OF RAT'S SALIVARY GLANDS. (Slo.) Pavlikova, D. (Katedra histologie a embryologie LFUK, Sasinkova 4, 884 24 Bratislava, Czechoslovakia). *Biologia (Bratisl.)* 30(12):911-919; 1975.

3867 THE ROLE OF HCO_3^--ATPase in H^+/HCO_3^--SECRETION. (Ger.) Simon, B.; Knauf, H. (Med. Univ. Klinik, Bergheimer Str. 58, D-6900 Heidelberg, W. Germany). *Klin. Wochenschr.* 54(3):97-104; 1976.

3868 EFFECT OF CALCITONIN ON THE ENZYMES OF THE DIGESTIVE TRACT. (Pol.) Rosciszewska, A. (Klinika Endokrynologii CMKP, 01-809 Warsaw, ul. Ceglowska 80, Poland). *Pol. Tyg. Lek.* 30(24):1043-1045; 1975.

SECRETION AND METABOLISM

Stomach

3869 REVERSIBILITY OF EFFECTS OF VERY HYPOTONIC FLUIDS ON IN VITRO FROG GASTRIC MUCOSA: A FUNCTIONAL AND MORPHOLOGICAL STUDY. (Eng.) Helander, H. F.; Sanders, S. S.; Shanbour, L. L.; Rehm, W. S. (Medical Center, Univ. Alabama Birmingham, Birmingham, AL). *Acta Physiol. Scand.* 95(4):353-363; 1975.

Functional and morphological properties of the *in vitro* frog gastric mucosa were studied during and after exposure to very hypotonic (≈25 mOsm) solutions. Within 20 min, the acid secretory rate decreased to zero, but it returned to normal levels after isotonic fluids were restored. The potential difference (PD) dropped within the first minutes after the exposure to hypotonic solutions, and became inverted. Following the return of isotonic conditions, the PD increased to levels higher than in the controls. The electrical resistance increased about 10-fold during the hypotonic period, but decreased to near normal values when isotonic conditions were restored. By light and electron microscopy, the cells of the hypotonic mucosa appeared greatly swollen, and the alterations were assessed by morphometric methods. The gland lumina were almost obliterated, and the lamina propria was reduced to about 60% of its former volume. After the return to isotonic conditions, normal morphology was restored. The great increase in resistance during the hypotonic period may have been caused by the occlusion of the gland lumina. Quantitative analyses of the Na, K, and Cl tissue concentrations by flame photometry and by a chloridimetry technique indicated a large loss of these ions during the hypotonic state. It is suggested that the epithelial cells in the hypotonic mucosae avoid bursting by rapidly letting large numbers of ions exit, which results in a cellular osmolarity close to that of the bathing fluids.

3870 METABOLISM OF HISTAMINE IN SECRETING INTACT AND ISOLATED CANINE STOMACH. (Eng.) Code, C. F.; Green, W. E. R.; Kennedy, J. C.; Ritchie, H. D.; Schlegel, J. F. (CURE, Building 115, Veterans Admin. Wadsworth Hosp., Los Angeles, CA 90073). *Am. J. Physiol.* 230(1):219-227; 1976.

Total ^{14}C activity in juice secreted by the gastric pouches of six dogs and seven isolated canine stomachs was determined in response to i.v. and intra-arterial (i.a.) infusions of histamine and [^{14}C]histamine. Histamine (1-3.5 µmol/hr, i.v.) was administered to intact dogs, producing secretory outputs from the pouches ranging from 25-65% of maximum. In the isolated stomachs, histamine (4 µmol/hr, including 250 µCi of [^{14}C]histamine) was administered into the arterial line. The proportions of ^{14}C attributable to histamine, N^{α}-methylhistamine (N^{α}MeH), N^{α}, N^{α}-dimethylhistamine ($N^{\alpha}N^{\alpha}$Me$_2$H), N-telle-methylhistamine (N^{τ}MeH), imidazole acetic acid (ImAA), N-methylimidazole acetic acid (N^{τ}MeImAA), acetylhistamine (AcH), and histaminol (HOH) were defined using thin layer chromatography. Similar estimates were made at the end of infusions on blood, gastric mucosa, and gastric muscle. Histamine and its primary methylated products accounted for 29% of the total ^{14}C activity in the juice from intact dogs, while histamine and its primary methylated products accounted for 70% of the total activity in the gastric juice from isolated perfused stomachs. Methylation was the major, or sole, route of metabolism of histamine in the gastric mucosa, and the major product was inactive N^{τ}MeH. Small quantities of the active N^{α}Me derivatives, particularly $N^{\alpha}N^{\alpha}$Me$_2$H, were identified in both the juice and mucosa. Little or no ImAA, N^{τ}MeImAA, AcH, or HOH was present in juice from isolated stomachs, while these products did occur in the juice from intact dogs, demonstrating that they are extragastric metabolites of histamine. It is concluded that methylation is the major, and likely the sole, route of histamine metabolism in the gastric mucosa of the dog.

3871 ETHANOL, INDOMETHACIN AND GASTRIC ACID SECRETION IN THE RAT. (Eng.) Karppanen, H.; Puurunen, J. (Dept. Pharmacology, Univ. Oulu, SF-90 220 Oulu 22, Finland). *Eur. J. Pharmacol.* 35(1):221-223; 1976.

Experiments were performed to determine whether the ethanol-induced decrease of gastric acid secretion observed in the rat is attributable to an increased production of prostaglandins. The secretion of gastric acid was determined by a perfusion method in anesthetized, male Sprague-Dawley rats. After the rate of the acid secretion was stabilized (in approximately 1 hr), 10% ethanol (4 ml/5 min for 60 min, i.v.) was given to 15 animals. A total cessation of gastric acid output was seen within 30-60 min. In 11 animals pretreated with indomethacin (30 mg/kg, i.v.) 90 and 30 min before administration of ethanol, the inhibition ranged from 0-83% (mean 51%). The results suggest that the inhibitory effect of local ethanol on gastric acid secretion in the rat may be mediated, at least partly, by increased synthesis of prostaglandins.

3872 EFFECTS OF ISOPROPYLNORADRENALINE ON TACHYPHYLAXIS OF GASTRIN STIMULATED GASTRIC ACID SECRETION AND MUCOSAL BLOOD FLOW IN THE ANAESTHETIZED CAT. (Eng.) Reed, J. D.; Smy, J. R. (Medical Sch., Univ. Newcastle upon Tyne, Newcastle upon Tyne, NE1 7RU, England). *J. Physiol. (Lond.)* 254(1):153-168; 1976.

The effect of isopropylnoradrenaline (IPNA)-induced gastric hyperemia on gastric acid secretion in the cat was investigated to determine the role of mucosal blood flow in the secretory response to gastrin. Gastrin was given i.v. as large doses [20-30 µg pentapeptide/15 min and 25 or 30 mg/15 min of a crude aqueous extract of the pyloric gland area (P.G.A.) which contains gastrin], or in small doses (1 µg pentapeptide/15 min and 1.0 or 0.25 mg P.G.A./15 min). The IPNA was infused arterially via the retrograde hepatic artery cannula or i.v. in doses that had no effect on systemic blood pressure. The pattern of response to large doses of pentapeptide (20-30 µg/15 min) was a rapid increase in acid output and mucosal blood flow (MBF), which followed the onset of stimulation and usually achieved maxima within an hour, progressively declining thereafter, despite continued stimulation. There was a significant negative correlation of acid secretion and MBF with time ($p<0.001$ for both). The pattern of acid and MBF responses to low doses of gastrin was similar to that with larger doses of gastrin, but the mean acid peak and MBF peak were lower. Infusion of IPNA produced increases in blood flow unrelated to time following the peak response to large doses of gastrin, while increases in acid appeared to be a partial removal of the acid tachyphylaxis. During stimulation by small doses of gastrin, IPNA increased both MBF and acid secretion above the peak responses to gastrin alone. Increases in gastrin-stimulated acid and MBF were also produced by expansion of the blood volume by a 7% dextran, 0.9% saline infusion. It is concluded that tachyphylaxis of gastric acid secretion to gastrin may be a function of the primary tachyphylaxis of MBF.

3873 THE INFLUENCE OF PROPRANOLOL ON SERUM GASTRIN CONCENTRATION AND HYDROCHLORIC ACID SECRETION IN RESPONSE TO HYPOGLYCEMIA IN NORMAL SUBJECTS. (Eng.) Kaess, H.; Kuntzen, O.; Teckentrupp, U.; Dorner, M. (Dept. Internal Medicine, Univ. Heidelberg, Heidelberg, W. Germany). *Digestion* 13(4):193-200; 1975.

The effect of propranolol (50 µg/kg, i.v. for 3 min) on serum gastrin concentration and HCl secretion during insulin hypoglycemia (0.2 U/kg insulin, i.v., 15 min after propranolol or saline) was inves-

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gated in 10 normal subjects. Blood samples were
ken at intervals up to 2 hr following insulin
ministration. Serum gastrin concentrations in-
eased from 139 to 179 pg/ml ($p<0.05$) 45 min after
sulin and declined slowly to 153 pg/ml. Propran-
ol decreased the fasting gastrin concentration
om 146 to 133 pg/ml ($p<0.05$) at 15 min, and the
vel was 136 pg/ml ($p<0.05$) at 30 min. The inte-
ated gastrin response to insulin was 1.0 ± 0.3 ng
the first hr and 2.2 ± 0.05 ng during the 2-hr
riod. Propranolol reduced the rise of gastrinemia
0.040 ± 0.20 ng/hr and 0.090 ± 0.30 ng/2 hr,
sp., ($p<0.01$). The secretion of HCl rose following
sulin administration from a base level of 0.75-
01 mEq/15 min to 5.7 mEq/15 min after 75 min, and
en decreased to 3.5 mEq/15 min after 2 hr.
opranolol increased the HCl secretion to insulin
poglycemia to a peak of 3.0 mEq/15 min at 75 min;
e level then fell to 2.5 mEq/15 min. The HCl
cretion was significantly lower between 45 and
5 min after insulin than in the control series
<0.05). The peak acid output was 12.6 ± 1.2 mEq/30
n compared to 7.5 ± 1.0 mEq/30 min ($p<0.02$) in the
opranolol experiments, and 30.3 ± 2.2 mEq compared
18.3 ± 2.3 mEq for tne 2-hr period ($p<0.01$).
e results support the hypothesis that there is a
-adrenergic component for the release of gastrin
d the secretion of HCl.

874 PROTEIN SYNTHESIS IN HUMAN GASTRIC MUCOSA:
EFFECTS OF PENTAGASTRIN, SECRETIN, AND 13-
le-MOTILIN. (Eng.) Mitznegg, P.; Domschke, W.;
omschke, S.; Belohlavek, D.; Sprugel, W.; Strunz, U.;
unsch, E.; Jaeger, E.; Demling, L. (Dept. Pharma-
ology, Univ. Erlangen-Nurnberg, Erlangen, W. Ger-
any). *Acta Hepatogastroenterol. (Stuttg.)* 22(5):
33-335; 1975.

he effects of pentagastrin, secretin, and motilin
n gastric mucosal protein synthesis were studied in
5 fasted volunteers. In a total of 29 observations,
he mean *in vitro* incorporation of ^{14}C-leucine into
he proteins of fundic gastric mucosa was 41.2 ±
.7 x 10^3 counts per min/mg protein. This figure
ncreased significantly in samples taken 1 and 4 hr
fter the subjects were given pentagastrin (6 μg/kg,
.c.) by 18.9% and 21.8%, resp. Secretin (2 clinical
/kg, i.v.) caused a 10.5% inhibition of leucine in-
orporation within a period of 1 hr, but this was
ot statistically significant. After continuous
.v. infusion of 13-norleucine-motilin (13-nle-
otilin, 0.4 μg/kg at 0.5 ml/min for 1 hr), the
ncorporation rate was reduced by 17.5%. Penta-
astrin did not change the rate of protein synthesis
n the duodenal mucosa. The data support the hypo-
hesis that in man, as well as in animals, penta-
astrin and gastrin may both have a trophic influ-
nce on the gastric mucosa.

875 GASTRIC SECRETION DURING ANAESTHESIA AND
ITS INHIBITION BY METIAMIDE AND OTHER
RUGS. (Eng.) Schachter, M.; Karpinski, E.;
aines, V. (Dept. Physiology, Univ. Alberta, Edmon-
ton T6G 2E1, Alberta, Canada). *Experientia* 31(8):
64-965; 1975.

The effects of metiamide, atropine, and hexamethonium on gastric acid secretion produced by chloralose-urethane anesthesia and by histamine were investigated in dogs. Metiamide (3.0 mg/kg, i.v.), when administered before or shortly after histamine (15-25 μg/kg, s.c.), either abolished or reduced to near zero the resulting gastric secretion in three experiments on two dogs. In three experiments on two dogs in which the animals were "spontaneously" secreting despite an empty stomach, the administration of metiamide also arrested the secretion, which was presumably of vagal origin since it was also abolished by atropine (75 μg/kg, i.v.). The same dosage of metiamide administered either just before or during anesthesia with a chloralose-urethane mixture (25 mg chloralose, 250 mg urethane/ml; 2.0 ml/kg, i.v.) produced a gastric secretion inhibition similar to that observed with the histamine-induced secretion in seven experiments on five dogs. The inhibitory effect was more effective if metiamide was given just prior to the induction of anesthesia. The administration of atropine (75 or 100 μg/kg, i.v.) or hexamethonium (3 mg/kg, i.v.) during anesthesia arrested acid secretion for observation periods of up to 60 min. It is clear that histamine H_2-receptor antagonists, perhaps in combination with anticholinergic agents, suppress gastric secretion of physiological or pathological origin.

3876 CHANGED CHOLINERGIC RECEPTOR CHARACTERISTICS AFTER VAGOTOMY IN GASTRIC FISTULA DOGS. (Eng.) Hirschowitz, B. I.; Gibson, R.; Wright, L.; Hutchison, G. (Univ. Alabama Medical Center, Birmingham, AL 35294). *Am. J. Physiol.* 230(1):105-109; 1976.

The kinetics of atropine antagonism to Urecholine- and pentagastrin-stimulated acid and pepsin secretion were defined in intact dogs with gastric fistulae and in dogs after fundic vagotomy. Although pentagastrin (0.1-10 μg/kg hr, i.v. in 45-min incremental step doses) was a much less effective stimulus after vagotomy, atropine (0.2-10 μg/kg hr) had very similar effects on the pentagastrin response before and after vagotomy. Stimulation of both acid and pepsin by Urecholine (20-320 μg/kg hr) remained unchanged by vagotomy but was uncompetitively inhibited by atropine in the intact dog, suggesting irreversible binding of atropine to gastric cholinergic receptors. However, after vagotomy, atropine inhibited Urecholine competitively, suggesting that atropine was now bound reversibly to cholinergic receptors. These changes are analogous to those occurring in muscle after denervation and suggest the growth of new cholinergic receptors with changed characteristics after denervation of the stomach.

3877 EFFECT OF BULBAR ACIDIFICATION ON BASAL SECRETION OF ACID AND GASTRIN IN DOG. (Eng.) Nilsson, G. (Dept. Pharmacology, Karolinska Institutet, Stockholm, Sweden). *Acta Physiol. Scand.* 95(4):477-481; 1975.

Experiments were conducted to determine whether acid perfusion of bulbar pouches induces acid secretion in Pavlov pouch dogs and whether acid perfusion influences plasma gastrin levels in these dogs. Five dogs were provided with mucosal septal pouches of the stomach and of the duodenal bulb. In some dogs, a gastric drainage cannula was inserted into the most dependent portion of the stomach. In dogs, which were found to secrete acid spontaneously during a control period at the start of each experiment, the bulbar pouches were perfused with 0.1 M HCl for 5-120 min. Bulbar acidification rapidly and profoundly reduced the basal acid output. In dogs, which did not secrete acid spontaneously during the control period, bulbar pouches were perfused with 0.1 M HCl for 1 hr. Bulbar acidification did not significantly influence the plasma gastrin concentration, and no acid was secreted from the Pavlov pouches following such acidification. The results support the hypothesis that reduction of the intrabulbar pH may contribute to the reduction of acid secretion during interdigestive periods. The physiological significance of mechanisms in the upper intestine that induce acid secretion following a reduction of the intraluminal pH is questioned.

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3878 ACTION OF SOMATOSTATIN AND METIAMIDE ON GASTRIC ACID SECRETION FROM ISOLATED BULLFROG GASTRIC MUCOSA. (Eng.) Warrick, M. W.; Lin, T.-M. (Lilly Res. Labs., Indianapolis, IN 46206). *Res. Commun. Chem. Pathol. Pharmacol.* 13(1):149-152; 1976.

The actions of somatostatin and metiamide on histamine- or pentagastrin-stimulated acid secretion were studied in the isolated bullfrog gastric mucosa. The doses of somatostatin and metiamide required for 50% inhibition of acid secretion induced by 10^{-5} M pentagastrin (control level $\geq$ 8 µEq/hr) were 7.36 x 10^{-6} M and 8.7 x 10^{-6} M, resp., and those for 20% inhibition of acid secretion were 3 x 10^{-8} M and 9.5 x 10^{-7} M, resp. The doses of somatostatin and metiamide required for 50% inhibition of acid secretion induced by 10^{-5} M histamine were 7.7 x 10^{-6} M and 6.3 x 10^{-5} M, resp., and for 20% inhibition, 6 x 10^{-8} M and 9.1 x 10^{-6} M, resp. Somostatin at 4.7 x 10^{-8} M suppressed spontaneous acid secretion by 50%. The slopes of the dose-response curves relating somatostatin and percent of inhibition, and those between metiamide and percent of acid inhibition, were different, suggesting that the mechanisms by which somatostatin and metiamide inhibit acid secretion are not the same.

3879 3-(β-AMINOMETHYL)-5-AMINO-1,2,4-TRIAZOL, A HISTAMINE-LIKE STIMULANT OF GASTRIC SECRETION. (Rus.) Grechishkin, L. L.; Gavrovskaia, L. K. (Inst. Experimental Medicine, USSR Acad. Medical Sciences, Leningrad, USSR). *Biull. Eksp. Biol. Med.* 79(6):71-73; 1975.

3880 APPLICATION OF THE AUTOMATIC EDMAN PROCEDURE TO ESTABLISH THE PRIMARY STRUCTURE OF SWINE PEPSINOGEN AND ITS FRAGMENTS. (Rus.) Belianova, L. P.; Baratova, L. A.; Pugacheva, I. B.; Revina, L. P.; Surova, I. A.; Stepanov, V. M. (Inst. Genetics and Selection of Industrial Microorganisms, Moscow, USSR). *Biokhimiia* 40(4):762-768; 1975.

3881 THE GLYCOPROTEINS OF DOG GASTRIC MUCUS. I. ISOLATION AND CHARACTERIZATION OF THE GLYCOPROTEINS FROM THE GASTRIC MUCOSA. (Fre.) Woussen-Colle, M. C.; Rasinski, C.; De Graef, J. (Hopital Saint-Pierre, 322, rue Haute, B 1000, Brussels, Belgium). *Biol. Gastroenterol. (Paris)* 8(4):275-282; 1975.

3882 THE GLYCOPROTEINS OF DOG GASTRIC MUCUS. II. COMPARATIVE STUDY OF MUCOSAL GLYCOPROTEINS AND THOSE SECRETED BY THE FUNDUS AND THE ANTRUM. (Fre.) Woussen-Colle, M. C.; Rasinski, C.; De Graef, J. (Hopital Saint-Pierre, 322, rue Haute, B 1000 Brussels, Belgium). *Biol. Gastroenterol. (Paris)* 8(4):283-289; 1975.

3883 EXPERIMENTAL STUDY ON THE RELATIONSHIP BETWEEN BRANCHES OF ABDOMINAL VAGUS AND GASTRIC SECRETION. (Jpn.) Katto, N. (Sch. Medicine, Tokushima Univ., Tokushima, Japan). *Shikoku Acta Med.* 31(5):337-361; 1975.

3884 STUDIES ON LOCALIZATION OF ^{3}H-PENTAGASTRIN IN THE REGION OF FUNDAL GLANDS IN THE RAT GASTRIC MUCOSA USING LIGHT AND ELECTRON AUTORADIOGRAPHY. (Rus.) Kiseleva, E. V.; Bersimbaev, R. P. (Lab. Cell Ultrastructure, Siberian Branch USSR Acad. Sciences, Novosibirsk, USSR). *Tsitologiia* 17(6):726-728; 1975.

3885 THE ACTION OF HYDROCORTISONE ON THE MITOTIC CYCLE OF EPITHELIAL CELLS OF THE PYLORUS OF THE MOUSE STOMACH. (Rus.) Avetisian, A. A. (Inst. Medical Genetics, USSR Acad. Medical Sciences, USSR). *Biull. Eksp. Biol. Med.* 79(6):92-95; 1975.

3886 ADENYLATE CYCLASE AND GASTRIC ACID SECRETION. (Ger.) Simon, B.; Kather, H.; Knauf, H. (Medizinische Universitatsklinik, Bergheimer Strasse 58, D-6900 Heidelberg, W. Germany). *Med. Klin.* 71(23):980-986; 1976.

3887 GASTRONE AS ANTRAL INHIBITOR OF GASTRIC SECRETION. (Ita.) Monetti, G. (Via Bisceglie, 21, Trani, BA, Italy). *Chir. Gastroenterol.* 9(1):112-122; 1975.

3888 AFFERENT REACTIONS IN GASTRIC BRANCHES OF THE VAGUS NERVE AS RELATED TO A PROGRESSING SECRETION PROCESS. (Rus.) Bagaev, V. A.; Nozdrachev, A. D.; Kurtsin, I. T. (I. P. Pavlov Inst. Physiology, USSR Acad. Sciences, Leningrad, USSR). *Fiziol. Zh. SSSR* 61(9):1359-1366; 1975.

See also, 3826, 3852, 3867, 3981, 4168.

Pancreas

889 LONG-TERM ORGAN CULTURE OF EMBRYONIC RAT PANCREAS IN A CHEMICALLY DEFINED MEDIUM.

Eng.) Parsa, I.; Marsh, W. H. (State Univ. New ork, Downstate Medical Center, 450 Clarkson Ave., rooklyn, NY 11203). *Am. J. Pathol.* 82(1):119-128; 976.

he morphologic, ultrastructural, and enzymatic evelopment of embryonic rat pancreas during long-erm organ culture was investigated. Embryonic at pancreas anlagen were grown in a chemically-efined medium, subdivided biweekly, and recultured or a total time of 10 weeks. The total mass incre-ent during the 10 weeks was in excess of 1,000-fold. amples were removed for light and electron micro-copic examination and for periodic measurement of nzymatic activity. Morphogenesis and cytodifferen-iation occurred. Peripheral outgrowth of epithelial uds was followed by the formation of interconnecting ubular structures and on days 4-7 of culture, by the ppearance of distinctive acinar cells with zymogen ranules. Mitotic figures became conspicuous at the eriphery of explants within a day after each sub-ivision, resulting in the formation of new tubular tructures and acini. In general, the central area f the explants presented more mature acini with ymogen granules than the periphery. While exogenous nsulin (8.0 mg/l of medium) and glucagon (4.0 mg/l f medium) were not requirements for short-term ulture (9 days), their addition was necessary for ong-term maintenance of culture. Hydrocortisone 4.0 mg/l of culture) improved the viability of cells uring prolonged cultures. The enzymatic activities f amylase, lipase, and chymotrypsin developed maxi-ally during the first week of culture, reached a lateau level by the second week, and remained at a elatively constant level throughout the 10-week cul-ure period. The results show that long-term organ ulture of embryonic rat pancreas beyond a 10-week eriod was successfully achieved.

890 STUDIES ON INTRACELLULAR TRANSPORT OF SECRETORY PROTEINS IN THE RAT EXOCRINE ANCREAS. II. INHIBITION BY ANTIMICROTUBULAR GENTS.

(Eng.) Seybold, J.; Bieger, W.; Kern, . F. (Dept. Anatomy, Univ. Heidelberg, D-6900 eidelberg, Im Neuenheimer Feld 307, W. Germany). *irchows Arch.* [*Pathol. Anat.*] 368(4):309-327; 975.

he possible role of microtubules and microfilaments n the secretory process of the rat exocrine pan-reas was analysed *in vitro* using isolated pancrea-ic lobules. The lobules were incubated with col-hicine, vinblastine, hexylene glycol, and cytochala-in B, and their effect on the three major steps in he secretory cycle (protein synthesis, intracellular ransport of newly synthesized proteins, and dis-harge of zymogen granules) was compared with ellular respiration. Colchicine, 10^{-2} M, inhibited rotein synthesis, while vinblastine caused 20% nhibition at 10^{-6} and 10^{-5} M and 55% inhibition t 10^{-4} M. A similar inhibition was observed with 1.5% hexylene glycol, while cytochalasine B at 1.5 and 10 μg/ml had no effect on protein synthesis. Colchicine and vinblastine had major effects on intracellular transport, both in secretion studies and cell fractionation experiments. Colchicine (10^{-3}-10^{-5} M) inhibited the discharge of newly synthesized proteins by 50%, while vinblastine showed a dose-response relation of 40% inhibition at 10^{-6} M to 90% at 10^{-4} M. Discharge of amylase was uniformly reduced by 30% by both colchicine and vinblastine in the entire dose range. In cell fractionation studies, both colchicine and vinblastine inhibited the disappearance of protein radioactivity from microsomes and its appearance in zymogen granules; similarly, the peak radioactivity in smooth microsomes (Golgi) appeared delayed. No differential effect on the secretory process was observed with 1.5% hexylene glycol or cytochalasin B (1.5 and 10 μg/ml). A fine structural analysis of microtubules and microfilaments in the exocrine pancreatic cell revealed their distribution in all parts of the cytoplasm and in relation to all cell organelles. Both systems (microtubules and microfilaments) seemed to be connected, at least in certain areas of the cytoplasm and at the plasma membrane. The reduction of transport efficiency by microtubule inhibitors resulted in a deposition of secretory material in the cisternal space of the rough endoplasmatic reticulum, which leads to the formation of paracrystals. Colchicine (10^{-3} M) caused an enlargement of condensing vacuoles in the Golgi complex. It is concluded that antimicrotubular agents have both specific and nonspecific cytotoxic actions.

3891 COMPARISON OF VASOACTIVE INTESTINAL PEPTIDE AND SECRETIN IN STIMULATION OF PANCREATIC SECRETION.

(Eng.) Konturek, S. J.; Pucher, A.; Radecki, T. (Inst. Physiology Medical Academy, Cracow, Poland). *J. Physiol. (Lond.)* 255(2):497-509; 1976.

Pancreatic volume flow and bicarbonate and protein secretion were measured in response to i.v. infusion of vasoactive intestinal peptide (VIP) and secretin or duodenal perfusion of sodium oleate and HCl solution in cats and dogs with chronic pancreatic fistula. Graded doses of VIP or secretin in cats evoked graded increases in pancreatic secretion that reached the highest level at doses of 16 μg/kg/hr and 4 U/kg/hr, resp. The addition of cerulein (0.2 μg/kg/hr) to VIP significantly ($p<0.01$) increased the dose-response curve for bicarbonate above that of VIP alone. The secretory response to secretin combined with cerulein (0.2 μg/kg/hr) or with VIP (4 μg/kg/hr) was significantly higher than to secretin alone, particularly at lower dose levels. Sodium oleate and HCl solution instilled into the duodenum of cats at graded doses produced similar pancreatic dose-response curves for volume flow and bicarbonate output, which reached 80 and 70%, resp., of the maximal observed response to exogenous VIP or secretin. Duodenal perfusion of oleate in dogs also stimulated pancreatic secretion in a dose-related manner. The highest maximal bicarbonate response to oleate was reached at 8.0 mM oleate, and it was 38% of that reached with exogenous secretin. The highest observed protein response to cerulein in dogs was reached at a dose of 0.5 μg/kg/hr and amounted to about 800 mg protein/30 min. Oleate and HCl were less effective stimulants of protein secretion, reaching 87 and 63%, resp., of that induced by cerulein. The results of the combined study on cats and dogs provide strong support for the concept that oleate releases VIP and that the difference in pancreatic secretion is due to the species-dependent pancreatic responsiveness to this peptide.

3892 ABSENCE OF EFFECTS OF DIBUTYRYL CYCLIC GUANOSINE 3',5'-MONOPHOSPHATE ON RELEASE OF α-AMYLASE, ^{45}Ca EFFLUX, AND PROTEIN SYNTHESIS IN RAT PANCREAS IN VITRO. (Eng.) Heisler, S.; Grondin, G. (Centre Hospitalier Universitaire, Universite Sherbrooke, Sherbrooke J1H 5NE, Quebec, Canada). *Experientia* 31(8):936-938; 1975.

The effect of dibutyryl cyclic guanosine-3'5'-monophosphate (dibutyryl cyclic GMP) on α-amylase release, ^{45}Ca efflux, and protein synthesis was studied in pancreas fragments from female Sprague-Dawley rats. Dibutyryl cyclic GMP (10^{-7}-10^{-3} M) did not alter basal α-amylase release (5.87% release in controls and 6.85% release with dibutyryl cyclic GMP) during a 30-min incubation period. Dibutyryl cyclic GMP did not influence carbachol (10^{-5} M)-stimulated enzyme release (12.48% release in controls and 13.83% release with dibutyryl cyclic GMP). At 10^{-5} M, dibutyryl cyclic GMP moderately increased the efflux rate of ^{45}Ca, although the increase was not statistically significant. Carbachol (10^{-5} M) increased the rate of ^{45}Ca efflux in comparison to untreated tissues, but depressed the rate of incorporation of ^{3}H-leucine into newly synthesized protein (from 879 dpm/mg/20 min in controls to 480 dpm/mg/20 min with carbachol). The latter effect was not duplicated by dibutyryl cyclic GMP (10^{-5} M) nor did the nucleotide alter the effect of carbachol. The results suggest that dibutyryl cyclic GMP does not affect the release of α-amylase, ^{45}Ca efflux, or protein synthesis in the rat pancreas *in vitro*. The results emphasize that exogenous dibutyryl cyclic GMP may be an agent of limited usefulness in confirming the hormonal actions of parasympathomimetic substances.

3893 CHANGES IN AMINO ACID TRANSPORT IN THE RAT PANCREAS IN RESPONSE TO FASTING AND FEEDING. (Eng.) Cheneval, J. P.; Johnstone, R. M. (Departement Sciences Biologiques, Universite du Quebec a Montreal, Montreal, Quebec, Canada). *Biochim. Biophys. Acta* 433(3):630-637; 1976.

The effect of feeding and fasting on changes in the transport of amino acid (*in vitro*) were investigated in the pancreas of young and adult Sprague-Dawley rats. A fast of 24 hr (young animals) or 48 hr (adult animals) reduced the uptake rate of aminoisobutyrate in the isolated rat pancreas *in vitro* following a 90-min incubation period. In contrast, refeeding of animals after a fast showed an increase in amino acid transport in young as well as adult animals. The effects of refeeding after a fast were mimicked, to a significant extent, by injection of mixtures of pancreozymin (5 Crick U/100 g body weight) and carbamylcholine (10^{-5} μmol). Addition of these agents *in vitro* had no effect. The incorporation of amino acids into the total proteins of the rat pancreas followed the pattern of amino acid uptake. Even at high external glycine (5 mM) levels, incorporation increased, although the glycine level in the cell was in excess of 25 mM. Reduction of glycine uptake by ouabain by 75% resulted in a substantial (44%) diminution of amino acid incorporation into proteins. The data suggest that inhibition of amino acid incorporation under the various metabolic conditions examined is due largely to a decreased availability of amino acids.

3894 PROTEIN SYNTHESIS AND SECRETION IN THE COBALT CHLORIDE DAMAGED EXOCRINE PANCREAS OF GUINEA PIGS. (Eng.) Jonas, L.; Putzke, H.-P.; Bienengraber, A. (Institut fur Allgemeine und Spezielle Pathologie, Universitat Rostock, DDR-25 Rostock, Strempelstrasse 14, E. Germany). *Exp. Pathol. (Jena)* 11(1/2):73-82; 1975.

A combined electron microscopic-autoradiographical investigation was used to examine disturbances in the mechanism of pancreatic acinar cell secretion produced by cobalt chloride ($CoCl_2$). Thirty-five male guinea pigs were given a single s.c. injection (20 mg $CoCl_2$/kg body weight) or, with a 24-hr spacing, a second or third s.c. injection (20 mg $CoCl_2$/kg body weight). Four hr before sacrifice, a single dose of ^{3}H-leucine (2 mCi, i.p.) was administered to each animal. Following administration of $CoCl_2$, the secretion of the exocrine pancreas decreased. During the first 12 hr, zymogen granules were extruded, but newly formed zymogenic material was pathologically stored in the Golgi complex. Under these conditions, regular enzyme granules were seldom formed, and the apical cell pole appeared nearly free of typical enzyme granules. By the third day, the Golgi apparatus had almost disappeared. Radioactive labeling showed that newly synthesized proteins were stored in the cisternae of the endoplasmic reticulum as granules. The Golgi apparatus seemed to be the center of the $CoCl_2$ attack. During the first phase, its transport and concentration functions were disturbed, with enzymes being stored in the cavity system. In the second phase, sufficient synthesis of new membrane was halted. There was damage to the mitochondria. The cobalt caused a marked inhibition of the activity of a series of enzymes, especially of succinic dehydrogenase, which was indicative of an energy shortage. This was compensated, in part, by the production of giant mitochondria after two or three days. It was not clear whether the damage to the Golgi apparatus was a primary or a secondary disturbance caused by an impairment of the mitochondria. The authors conclude that a combined electron microscopic-autoradiographic investigation makes qualitative and quantitative statements about disturbances in the mechanism of

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pancreatic acinar cell secretion under the influence of $CoCl_2$ possible, especially as far as the Golgi apparatus is concerned.

3895 ROLE OF CALCIUM IN EXOCRINE PANCREATIC SECRETION. II. COMPARISON OF THE EFFECTS OF CARBACHOL AND THE IONOPHORE A-23187 ON ENZYME SECRETION AND CALCIUM MOVEMENTS IN RABBIT PANCREAS. (Eng.) Schreurs, V. V. A. M.; Swarts, H. G. P.; De Pont, J. J. H. H. M.; Bonting, S. L. (Dept. Biochemistry, Univ. Nijmegen, Nijmegen, Netherlands). *Biochim. Biophys. Acta* 419(2):320-330; 1976.

The role of calcium in exocrine pancreatic secretion was studied by comparing the effects of carbachol and ionophore (A-23187) on calcium movement and amylase secretion in the isolated pancreas and pancreas fragments of New Zealand white rabbits. The fragments were preloaded with $^{45}Ca^{++}$ for 2 hr and then washed. Following a control period, there were either five 15-min efflux periods or 24 5-min experimental periods. Amylase activity and radioactivity were determined using the internal standard method. Protein and calcium concentrations were also determined. When 10^{-5} M carbachol was added to the efflux medium, there was an immediate increase in the efflux of amylase and Ca^{++}. The Ca^{++} efflux returned to normal after 30 min, but the increase in amylase efflux continued for the remainder of the experiment. The addition of A-23187 (10^{-6} M) resulted in only a small increase in amylase efflux and had only a slight effect on Ca^{++} efflux in the Ca^{++}-free medium. When, 30 min later, the Ca^{++}-free medium was replaced by a Krebs-Ringer bicarbonate medium (with or without Mg^{++}), a significant increase in amylase efflux was found, while the $^{45}Ca^{++}$ efflux rate decreased. The action of A-23187 is Ca^{++}-dependent, whereas this dependency is much less for carbachol. Since the cytoplasmic Ca^{++} concentration is very low, the effect of carbachol cannot be explained by increased Ca^{++} permeability of the serosal membrane. Carbachol released Ca^{++} from intracellular stores not attached by A-23187. It is suggested that increased cytoplasmic Ca^{++} is essential in the physiological stimulus-secretion coupling and that the Ca^{++} originates intracellularly, indicating that Ca^{++} acts as a third messenger in the pancreatic stimulus-secretion coupling.

3896 CALCIUM-ACTIVATED ATPase ACTIVITY IN A PLASMA MEMBRANE RICH PREPARATION OF RAT PANCREAS. (Eng.) Forget, G.; Heisler, S. (Dept. Physiology, Univ. Sherbrooke, Sherbrooke, Quebec, Canada). *Clin. Exp. Pharmacol. Physiol.* 3(1):67-72; 1976.

Calcium-stimulated ATPase activity was studied in a plasma-membrane-rich fraction of Sprague-Dawley rat pancreas homogenate to determine whether it is responsive to pancreozymin (PZ) and/or carbachol. The ATP hydrolytic activity of the plasma membrane was assessed in the presence of a varying concentration of Ca (0.125-4 mM) or Mg (0.25-4 mM). Peak hydrolytic activity was observed with a concentration of 1-2 mM Ca or 2 mM Mg. The addition of 2 mM Mg to a buffer containing 1 mM Ca increased the hydrolytic activity only slightly (13%). Monovalent cations such as Na^+ (10-100 mM) or K^+ (0.5-10 mM) did not affect the ATPase activated by 1 mM Ca. The addition of ouabain (2 mM) or 2,4-dinitrophenol (0.1-0.2 mM) to the incubation had no effect on the enzyme activity stimulated by Ca (1 mM). Pancreozymin (0.01-2 Crick U/ml) inhibited the enzyme activated in the presence of 1 mM Ca from 15 to 60%. Neither carbachol (10^{-7} M, 10^{-5} M) nor dibutyryl cyclic AMP (10^{-5}-10^{-3} M) affected this enzyme activity, though at the concentrations used, both were capable of stimulating enzyme secretion. Cyclic AMP itself (1 mM) did not affect enzyme activity. It is suggested that the plasma membrane Ca-activated enzyme is not involved in the active Ca extrusion previously reported to occur with use of the various pancreatic secretagogues tested.

3897 EVALUATION OF THE POTASSIUM LOSS THROUGH KEHR'S T TUBE AND THROUGH AN EXTERNAL DUODENAL FISTULA. (Ita.) Bazzocchi, R.; Capizzi, F. D. (Istituto di Clinica Chirurgica Generale e Terapia Chirurgica 1^a, Universita di Bologna, Bologna, Italy). *Clinica (Bologna)* 31(3/4):197-204; 1976.

3898 EFFECT OF TEMPERATURE AND INITIAL CONCENTRATION OF COMPONENTS ON SYNTHESIS OF INTERNUCLEOTIDE BOND CATALYZED BY PANCREATIC RIBONUCLEASE. (Rus.) Kavunenko, A. P.; Kalacheva, T. N.; Tikhomirova-Sidorova, N. S.; Takunitskaia, L. M. (Inst. Macromolecular Compounds, USSR Acad. Sciences, Leningrad, USSR). *Biokhimiia* 40(4):755-761; 1975.

See also, 3823, 3867, 3935, 3976.

Hepatobiliary Tract

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3899 CHANGES OF α-GLYCEROPHOSPHATE DEHYDROGENASE ACTIVITY IN FATTY LIVER OF RATS BY AMINO ACID IMBALANCE. (Eng.) Ogura, M.; Katsunuma, E.; Akabane, T.; Ogawa, S. (Faculty Agriculture, Utsunomiya Univ., Utsunomiya, Japan). *Agric. Biol. Chem.* 40(1):235-236; 1976.

Changes in hepatic α-glycerophosphate dehydrogenase activity were studied in male Wistar rats on a basal diet (8% casein) and on diet with an amino acid imbalance (basal diet plus 0.3% DL-methionine). After 5 and 10 days on either diet, five rats of each group were killed, and the liver weights and enzyme activities were determined. Fatty liver was observed in the animals on the imbalanced diet after 10 days. The specific activity of α-glycerophosphate dehydrogenase was significantly higher after 5 and 10 days in the rats on the imbalanced diet (31.2 nmol/hr/mg protein and 30.5 nmol/hr/mg after 5 and 10 days, resp.) than that in the rats on basal diet (17.3 nmol/hr/mg and 22.3 nmol/hr/mg after 5 and 10 days, resp.), which was at the level of zero time control (20.8 nmol/hr/mg). The total liver activity on the basis of body weight was also significantly higher in the rats on the imbalanced diet (25.1 nmol/hr/mg protein and 25.3 nmol/hr/mg at 5 and 10 days, resp.) than in animals on the basal diet (14.3 nmol/hr/mg and 18.8 nmol/hr/mg at 5 and 10 days, resp.). The elevation of α-glycerophosphate dehydrogenase activity may suggest that the supply of α-glycerophosphate for triglyceride synthesis is increased in this type of fatty liver.

3900 IDENTIFICATION AND CHARACTERIZATION OF A BILE ACID RECEPTOR IN ISOLATED LIVER SURFACE MEMBRANES. (Eng.) Accatino, L.; Simon, F. R. (Departamento de Medicina Interna, Universidad Catolica de Chile, Casilla 114-D, Santiago, Chile). *J. Clin. Invest.* 57(2):496-508; 1976.

The possibility that bile acid receptors are present in liver surface membranes was investigated in Sprague-Dawley rats. Isolated membranes were incubated at 4 C with $[^{14}C]$cholic acid and $[^{14}C]$-taurocholic acid, and membrane-bound bile acid was separated from free bile acid by a rapid ultrafiltration technique through glass-fiber filters. Specific bile acid binding was rapid and reversible and represented approximately 80% of the total bile acid bound to liver surface membranes. Taurocholic acid binding was independent of the medium pH, while cholic acid binding demonstrated an optimum at pH 6.0. Apparent maximal binding capacity and dissociation constant values indicated a large capacity system of receptors with an affinity for bile acids comparable to that of the hepatic transport mechanism. Scatchard analysis of the saturation kinetics, as well as inhibition studies, suggested that bile acids bind to a single and noninteracting class of receptors. In addition, BSP also inhibited cholic acid binding. In contrast, no inhibition was demonstrated with indocyanine green and probenecid. Specific bile-acid binding was enriched and primarily located in liver surface membranes and was found only in tissues involved in bile acid transport. Specific bile acid binding was independent of Na^+, Ca^{2+}, and Mg^{2+} and did not require metabolic energy. In addition, thiol groups and disulfide were not required for activity at the binding site. However, specific bile-acid binding was markedly decreased by low concentrations of proteolytic enzymes and was also decreased by the action of neuraminidase and phospholipases A and C. The results are consistent with the existence of a homogeneous bile acid receptor protein in liver surface membranes. The primary surface membrane location of this receptor, its binding properties, and its ligand specificity suggest that bile acid binding to this receptor may represent the initial interaction in bile acid transport across liver surface membranes.

3901 EFFECTS OF SOME BILE ACIDS ON HEPATIC BLOOD FLOW IN DOGS--WITH REFERENCE TO BILIARY EXCRETION. (Eng.) Yamatake, Y.; Ishikawa, S.; Yanaura, S. (Hoshi Coll. Pharmacy, Shinagawa-ku, Tokyo 142, Japan). *Jpn. J. Pharmacol.* 26(2):273-275; 1976.

The effects of dehydrocholic acid (DHC), ursodeoxycholic acid (UDC), and chenodeoxycholic acid (CDC) on portal and liver tissue blood flow and on bile formation were investigated in male dogs. The three bile acids (3, 10, and 30 mg/kg, i.v.) caused a dose-dependent increase in the volume of biliary outflow. The order of potency was as follows: DHC>UDC>CDC. DHC and UDC, both at 10 mg/kg, caused only a transient and slight change in both portal and liver tissue blood flow. At 30 mg/kg, DHC and UDC moderately increased liver tissue blood flow for at least 30 min, while portal blood flow was transiently decreased by DHC and increased by UDC. CDC caused the strongest responses of hepatic and systemic circulation. CDC at 30 mg/kg produced a significant increase in portal and liver tissue blood flow. These findings suggest that there is no significant relation between the effects of bile acids on biliary excretion and hepatic blood flow.

3902 CYTOCHROME P-450-DEPENDENT HYDROXYLATIONS IN BIOSYNTHESIS AND METABOLISM OF BILE ACIDS. (Eng.) Bjorkhem, I.; Danielsson, H.; Wikvall, K. (Huddinge Hosp., S141 86 Huddinge, Sweden). *Biochem. Soc. Trans.* 3(6):825-828; 1975.

Hydroxylations in the formation and metabolism of bile acids were investigated in reconstituted systems from liver microsomal fractions of male Sprague-Dawley rats, consisting of partially purified cytochrome P-450 and NADPH-cytochrome P-450 reductase. The microsomal fraction of homogenates was isolated by centrifugation of the 20,000 *g* supernatant of liver homogenate at 100,000 *g* for 1 hr. The 7α-hydroxylation of cholesterol was the major rate-limiting step in the overall conversion of cholesterol into bile acids. The reaction exhibited characteristics of a cytochrome P-450-dependent hydroxylation. It showed the unique properties of the different hydroxylations in the biosynthesis and metabolism of bile acids. The reaction was stimulated by biliary drainage and was inhibited by feeding of various bile acids. In the 12α-hydroxylation, the main substrate was 7α-hydroxy-4-cholesten-3-one. The reaction was catalyzed by a reconstituted system. The extent of inhibition by CO was markedly lower than that of other cytochrome P-450-catalyzed reactions. The reaction was stimulated by starvation. The preferred substrates in microsomal 26-hydroxylation are 5β-cholestane-3α,7α-diol, and 5β-cholestane-3α,7α,12α-triol, and the reaction was catalyzed by a reconstituted system. In both intact microsomal fractions and reconstituted systems, 26-hydroxylation was accompanied by 25-hydroxylation. The mitochondrial 26-hydroxylation depended on intramitochondrially generated NADPH and was a mono-oxygenase reaction, which was inhibited by CO. The properties of the hydroxylations in the biosynthesis of bile acids are such that it appears difficult to reconcile these with a single catalytic system.

3903 EFFECTS OF TAURODIHYDROFUSIDATE, A BILE SALT ANALOGUE, ON BILE FORMATION AND BILIARY LIPID SECRETION IN THE RHESUS MONKEY.

(Eng.) Beaudoin, M.; Carey, M. C.; Small, D. M. (Hosp. Notre-Dame, Montreal, Canada). *J. Clin. Invest.* 56(6):1431-1441; 1975.

The biliary secretion of sodium taurodihydrofusidate (TDHF), a bile salt analogue, and its influence on bile formation and biliary lipid secretion were studied in female rhesus monkeys. Unanesthetized monkeys, prepared with a total biliary fistula, were allowed to reach a steady bile salt secretion rate before each study. In three animals (group I), a 0.63% solution of $[^{14}C]$TDHF (2-4 μCi) was infused i.v. Most of the compound was secreted rapidly in bile, which was chemically unchanged. The biliary secretion of this drug produced a twofold increase in bile flow; however, the bile salt output was markedly reduced during the infusion. In spite of this reduction, the phospholipid output remained essentially unchanged, whereas the cholesterol output increased almost twofold. In five other animals (group II), the effect of TDHF on the bile salt secretion was further investigated by an i.v. infusion of $[^{14}C]$-taurocholate followed by a simultaneous infusion of 0.48% $[^{14}C]$taurocholate (3 μCi; 200 μmol/hr, 4 hr) and 1.11% TDHF (3 μCi; 200 μmol/hr, 4 hr). When TDHF was added to the infusate, a reduction in the $[^{14}C]$taurocholate output and a progressive rise in the plasma $[^{14}C]$taurocholate concentration were observed in each animal. An analysis of the data in both groups indicated that: (a) TDHF interfered with bile salt secretion into the biliary canaliculi; (b) TDHF induces a greater secretion of biliary water than was observed with bile salts, an effect consistent with a stimulation of the bile salt-independent canalicular flow; and (c) at similar 3α-hydroxysteroid secretion rates, TDHF caused a significant increase in cholesterol secretion compared to that induced by bile salt. This finding suggests that TDHF affects cholesterol metabolism or secretion in a way that is distinct from bile salts. Thus, the solubilization of biliary lipids in mixed micelles, although essential, is only one of the factors that determine their secretion into bile.

3904 STORAGE OF IRON AS FERRITIN IN THE LIVER OF THE PROTEIN-DEFICIENT RAT. (Eng.)

Stanton, M.; Ramsay, W. N. M. (Dept. Biochemistry, Univ. Edinburgh, Edinburgh EH9 1QH, U.K.). *Biochem. Soc. Trans.* 3(6):939-940; 1975.

Experiments were conducted to determine whether the protein-deficient rat maintains more ferritin protein or produces molecules with a higher average iron content. Male and female rats were fed for 5 weeks on diets lacking or containing 22% protein as casein. All diets contained 3-4 mg ferritin. More ferritin iron was found in the livers of protein-deficient male rats (2 experiments: 1.81 and 1.47 mg/liver) than in animals fed a casein-containing diet (1.19 and 1.17 mg, resp.; $p<0.01$ and $p<0.05$, resp.). No significant difference was seen with females. The livers of protein-deficient males contained ferritin with 20-30% more iron atoms per molecule (2509 and 2026 atoms/molecule) than ferritin from the livers of animals on casein-containing diets (2067 and 1489 atoms/molecule, $p<0.01$ and $p<0.05$, resp.). This difference was not observed in the females. Although the level of ferritin protein fluctuated from one experiment to another, it was clear that in both sexes the amount of ferritin protein was well maintained in the face of severe protein deficiency. It appears that male protein-deficient rats may respond at least partly to the demand for increased iron storage by increasing the average iron content of ferritin molecules. The results suggest that the behavior of ferritin is different from that of secreted proteins.

3905 CARBOHYDRATE METABOLISM IN PERFUSED LIVERS OF ADRENALECTOMIZED AND STEROID-REPLACED RATS.

(Eng.) Exton, J. H.; Miller, T. B., Jr.; Harper, S. C.; Park, C. R. (Vanderbilt Univ. Sch. Medicine, Nashville, TN 37232). *Am. J. Physiol.* 230(1):163-170; 1976.

Changes in glucose, glycogen, and certain metabolite levels were studied in livers from normal, adrenalectomized, and glucocorticoid-restored Sprague-Dawley rats perfused with lactate or fructose, to locate the sites at which glucocorticoids stimulate gluconeogenesis and glycogen synthesis in the liver. In livers from fasted rats perfused with bicarbonate buffer containing bovine albumin and erythrocytes, adrenalectomy decreased glycogen levels and glucose production, impaired the incorporation of ^{14}C from 20 mM $[^{14}C]$lactate into glucose or glycogen, and decreased the activity of the active (I) form of glycogen synthase. Cortisol (2.5 mg, s.c., 24, 16, and 4 hr prior to perfusion) treatment restored gluconeogenesis after 1 hr and glycogen synthesis after 2 hr. Adrenalectomy did not alter the production of glucose or lactate or the levels of gluconeogenic intermediates in livers from fasted rats perfused with 20 mM fructose, but reduced the forma-

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tion of glycogen from this substrate. Adrenalectomy increased the levels of lactate and pyruvate in livers from fasted rats perfused with lactate and decreased the levels of *P*-pyruvate and subsequent intermediates in the gluconeogenic pathway. These changes were reversed by cortisol treatment. It is concluded that glucocorticoids support gluconeogenesis and glycogen synthesis in livers from fasted rats primarily by facilitating a reaction(s) located between pyruvate and *P*-pyruvate in the gluconeogenic pathway and by promoting the conversion of (inactive or active) glycogen synthase.

3906 HEPATIC ACCUMULATION OF VITAMIN D_3 AND 25-HYDROXYVITAMIN D_3. (Eng.) Rojanasathit, S.; Haddad, J. G. (Jewish Hosp. St. Louis, St. Louis, MO). *Biochim. Biophys. Acta* 421(1):12-21; 1976.

Experiments were conducted to determine whether serum 25-hydroxycholecalciferol (25-OH-vitamin D_3) directly influences hepatic calciferol 25-hydroxylase or simply reflects its activity. Concomitant i.v. administration of 25-hydroxycholecalciferol and [^{3}H]-vitamin D_3 to vitamin D-depleted Wistar rats did not affect the conversion of [^{3}H]vitamin D_3 to 25-OH-[^{3}H]vitamin D_3, as indicated by a serum 25-OH-[^{3}H]vitamin D_3 content at 3 and 24 hr identical to those observed in animals receiving [^{3}H]vitamin D_3 alone. Similarly, pre-dosing with 25-OH vitamin D 24 hr earlier did not affect the conversion. Co-administration to vitamin D-depleted rats of vitamin D_2 or D_3, at 200-fold higher doses than a control group receiving tracer [^{3}H]vitamin D_3 alone, resulted in serum 25-OH vitamin D levels that were 15- to 20-fold higher than the control. These results indicate a similar metabolic fate for synthetic and natural vitamin D in rats, and the ability of increased substrate to overwhelm hepatic constraints on 25-OH vitamin D production. Following the i.v. administration of 25-OH-[^{3}H]vitamin D_3 to vitamin D-depleted rats, hepatic ^{3}H content decreased in parallel with serum radioactivity. Hepatic accumulation of i.v. administered vitamin D_3 ([^{14}C]vitamin D_3), alone or with 25-OH-[^{3}H]vitamin D_3, by vitamin D-depleted rats, revealed a marked preference for vitamin D_3; the hepatic accumulation of [^{14}C]vitamin D_3 increased to 35% of the dose by 45 min, at which time 25-OH-[^{3}H]vitamin D_3 hepatic content was sevenfold less, and decreasing. Chromatography of extracts of hepatic subcellular fractions revealed more [^{14}C]vitamin D_3 than 25-OH-[^{3}H]vitamin D_3 in the microsomes, the reported site of calciferol 25-hydroxylase. Circulating 25-OH vitamin D, therefore, has comparatively minimal potential for hepatic accumulation. Product inhibition of the calciferol 25-hydroxylase must, therefore, result from recently synthesized hepatic 25-OH vitamin D, and is not affected by exogenous 25-OH vitamin D_3.

3907 CLASS-ORGANIZATION OF THE HEPATOCYTES. EARLY CHANGES FOLLOWING ACUTE INTOXICATION BY DRUGS AND POISONS. (Eng.) Tongiani, R.; Malvaldi, G.; Chieli, E. *In: New Trends in the Therapy of Liver Diseases. Proceedings of the International Symposium on New Trends in the Therapy of Liver Diseases, Tirrenia, June 6-7, 1974.* Bertelli, A., ed. (Basel: S. Karger): pp. 27-37; 1975.

Early changes in cell class patterns of hepatocytes of male Sprague-Dawley rats were investigated following acute intoxication by drugs and poisons. Rats were given thioacetamide (10 and 25 mg/kg body weight, i.p.), α-amanitin (50 and 100 μg/100 g body weight, i.p.), phalloidin (40 μg/100 g body weight, i.p.), and phenobarbital (7 mg/100 g body weight/day, i.p.). The weight of the total solid constituents of the hepatocytes was determined in single cells isolated and suspended in anhydrous glycerol. The cell dry mass was determined by a microinterferometric integrating apparatus. There was a marked decrease in the number of classes within 1.5 hr following administration of 25 mg thioacetamide and within 3 hr following 10 mg thioacetamide, due to the disappearance of the three heaviest classes. Three classes disappeared following both doses of α-amanitin. After administration of both poisons, there was a shift of hepatocytes to the lighter classes. The presence of cells in the intervals among the classes, particularly 3 hr after phalloidin administration, represented the most notable change in class pattern. Phenobarbital injection was followed by a marked increase in the number of classes, which reached 14 after 1 day versus 12 in the controls, and 21 after 4 days. It is concluded that the usefulness of this technique for assessing early hepatocyte damage was demonstrated.

3908 LIVER ALDEHYDE AND ALCOHOL DEHYDROGENASE ACTIVITIES IN RAT STRAINS GENETICALLY SELECTED FOR THEIR ETHANOL PREFERENCE. (Eng.) Koivula, T.; Koivusalo, M.; Lindros, K. O. (Dept. Medical Chemistry, Univ. Helsinki and Res. Lab. State Alcohol Monopoly (Alko), Helsinki, Finland). *Biochem. Pharmacol.* 24:1807-1811; 1975.

Liver aldehyde and alcohol dehydrogenase activities were investigated in rat strains raised by genetic selection for either high (AA strain) or low (ANA strain) voluntary ethanol consumption. The soluble, mitochondrial, and microsomal fractions prepared from male and female liver tissues of both strains were examined spectrophotometrically. Liver alcohol dehydrogenase activity was higher in both sexes in the ANA strain ($p<0.005$) than the AA strain. With propionaldehyde (4.5 mM) as substrate, female rats of the AA strain had significantly higher aldehyde dehydrogenase activity in both mitochondrial ($p<0.025$) and microsomal ($p<0.005$) fractions than did females of the ANA strain, but in the soluble fraction, the aldehyde dehydrogenase activity was higher ($p<0.025$) in ANA rats. The total activity in female rats was higher ($p<0.05$) in the AA strain. In male rats, differences were significant ($p<0.025$) only in the microsomal fraction in which AA rats had higher activity. With acetaldehyde (0.5 mM) as substrate, aldehyde dehydrogenase activity was higher in the soluble fraction prepared from livers of both female ($p<0.005$) and male ($p<0.025$) ANA rats. In the microsomal fraction, AA rats had higher activity ($p<0.005$) in both sexes than ANA rats. The NAD-dependent acetaldehyde utilization was sig-

:icantly higher in preparations from AA rats than
those from ANA rats, both in females ($p<0.001$) and
males ($p<0.05$), with 0.40 mM acetaldehyde as sub-
:ate. The higher alcohol dehydrogenase and lower
lehyde dehydrogenase activity in rat livers of the
ianol-avoiding ANA strain may contribute to the
eviously found higher acetaldehyde levels in blood
l liver of rats of this strain after ethanol admin-
:ration.

9 THE EFFECT OF INHIBITORS OF ALCOHOL METABOLISM ON THE CHANGES IN THE HEPATIC ROSOMAL METABOLISM OF FOREIGN COMPOUNDS PRODUCED A SINGLE DOSE OF ETHANOL IN THE RAT.

(Eng.)
nt, L.; Powis, G. (Dept. Pharmacology, Glasgow
v., Glasgow G12 800, Scotland). *Br. J. Pharma-*
. 56(3):376P-377P; 1976.

empts were made to distinguish between the
ect effects of ethanol and the effects resulting
m the metabolism of the ethanol on the hepatic
rosomal metabolism of foreign compounds in unan-
hetized rats. Acetaldehyde oxime (200 mg/kg,
.) alone produced no significant change in ani-
e hydroxylation, but caused an increase in ani-
e hydroxylation in animals fed ethanol
mmol/kg) from 9.4 ± 0.4 to 21.9 ± 1.3 nmol/mg/30
($p<0.01$). Acetaldehyde oxime produced a de-
ase in aminopyrine demethylation of a magnitude
ilar to that caused by ethanol itself, although
re was no additive effect when both compounds
e administered together. Pyrazole (200 mg/kg,
.) produced an increase in aniline hydroxylation
a decrease in aminopyrine demethylation.
taldehyde (22 mmol/kg, fed 24 and 18 hr before
preparation of the microsomal fraction) had no
ect on aniline hydroxylation, but produced a de-
ase in aminopyrine demethylation from 105.3 to
5 nmol/mg/30 min ($p<0.01$). Disulphiram
) mg/kg, i.p.) reduced aminopyrine demethylation
70.9 nmol/mg/30 min ($p<0.01$), and also potenti-
l the decrease in aminopyrine demethylation in
s fed only half the previous dose (i.e., half of
mol/kg) of acetaldehyde to 37.9 ± 5.1 nmol/mg/30
($p<0.05$). It is concluded that the increase
niline hydroxylation produced by the administra-
ı of ethanol is a consequence of the ethanol
elf, while the decrease in aminopyrine demethyla-
ı is a consequence of the metabolism of ethanol
cetaldehyde.

) EFFECT OF ETHANOL ON UTILIZATION OF PLASMA FREE FATTY ACIDS FOR LIVER TRIACYL-EROL SYNTHESIS AND ITS RELATION TO HEPATIC TRIA-LYCEROL ACCUMULATION IN RATS.

(Eng.) Johnson,
Hernell, O.; Olivecrona, T. (Dept. Chemistry,
. Umea, S-901 87 Umea, Sweden). *Lipids* 10(12):
-769; 1975.

effects of ethanol (2.00, 3.75, or 6.00 g/kg
weight) on the utilization of plasma free fatty
s for liver triacylglycerol synthesis and its
tion to hepatic triacylglycerol accumulation
investigated in female Sprague-Dawley rats.
als of experiment I were given 0.5 ml of a
y acid (^{14}C-oleic acid) albumin complex (containing 10 x 10^6 cpm/ml). Rats given 3.75 or 6 g of ethanol were markedly ataxic between 0 and 6 hr. In contrast, rats given 2 g ethanol could not be distinguished in behavior from control rats. Six hours after the ethanol was administered, all rats in experiment I had increased liver triacylglycerol concentrations compared with the controls ($p<0.01$). The groups given 3.75 and 6 g of ethanol had similar, high triacylglycerol concentrations and high plasma ethanol concentrations. The groups ($p>0.05$) not given fatty acid showed no statistically significant difference in liver triacylglycerol concentration. After 6 hr, the liver triacylglycerol concentration decreased in the group given 2 g ethanol. From 6-11 hr, the mean values of the liver triacylglycerol concentrations increased in both the 3.75- and 6-g groups. At 11 hr, the rats given 3.75 g ethanol had little or no ethanol left in the blood, while the rats given 6 g still had a high plasma ethanol concentration. Between 11 and 16 hr, the liver triacylglycerol concentration did not decrease in the group given 6 g, while it did decrease in the group given 3.75 g ($p<0.05$). The results confirm those of a previously published report by the authors that after a lag period of several hours, ethanol increased the plasma triacylglycerol concentrations, probably by increasing liver triacylglycerol secretion.

3911 THE EFFECTS OF ETHANOL AND OF A MIXTURE OF ETHANOL AND HIGHER-ALCOHOLS ON THE ACTIVITY OF MICROSOMAL ANILINE HYDROXYLASE IN THE RAT LIVER.

(Eng.) Auty, R. M.; Branch, R. A. (Univ. Bristol Medical Sch., University Walk, Bristol BS8 1TD, U.K.). *J. Pharm. Pharmacol.* 28(2):160-161; 1976.

The influence of chronic administration of a cocktail of n-propyl, n-butyl, and iso-amyl alcohol on the activity of microsomal aniline hydroxylase in the livers of male Wistar rats was compared with that of ethanol alone. Six animals received 10% ethanol (volume/volume) in water for 28 days followed by 20% ethanol for 42 days; six animals received a cocktail of ethanol (10% for 28 days and 20% for 42 days in water), n-propanol (804 mg/l), n-butanol (3.24 mg/l), and iso-amyl alcohol (2.45 g/l). Ethanol alone resulted in a 49% increase in microsomal protein concentration and a 49.5% increase in aniline hydroxylase activity. The cocktail resulted in an 81% increase in microsomal protein concentration and a 41% increase in aniline hydroxylase activity. Aniline hydroxylase activity per gram of microsomal protein remained constant after treatment with ethanol, indicating an increase in functioning hepatic mass rather than an increase in enzyme activity. The aniline hydroxylase activity was less marked after the treatment with the cocktail than either after ethanol alone or control. The inability of the additional microsomal protein resulting from the administration of the cocktail to hydroxylate aniline suggests the possibility of specific enzyme induction.

3912 DEPENDENCE ON DOSE OF THE ACUTE EFFECTS OF ETHANOL ON LIVER METABOLISM IN VIVO.

(Eng.) Guynn, R. W.; Pieklik, J. R. (Univ. Texas

Medical Sch. Houston, Houston, TX 77025). *J. Clin. Invest.* 56(6):1411-1419; 1975.

The effects of various doses of ethanol on liver intermediary metabolism was tested *in vivo* in unanesthetized male Wistar rats. Ethanol was given i.p. in doses of 0.69, 1.7, or 3.0 g/kg in equal volumes (20 ml/kg) to three groups of animals. The liver was freeze-clamped 120 min after injection, and multiple metabolites were measured in the perchloric acid extract of the tissue. Each group showed a significantly different pattern of metabolites, redox states, and phosphorylation potentials, although the rate of ethanol disappearance, at least between the two highest dose groups, was not significantly different. The mitochondrial free $[NAD^+]/[NADH]$ ratios and the cytoplasmic free $[NADP^+]/[NADPH]$ ratio were most reduced with the lowest dose of ethanol and they became progressively more oxidized with increasing dose. Once established, the differences in these ratios between the groups tended to persist with time, relatively independent of the concentration of ethanol. In a somewhat different pattern, the phosphorylation potential ($[ATP]/[ADP][P_i]$) remained at the control level in the low-dose group but was significantly elevated in the two higher-dose groups. The results indicate distinct and complicated dose-dependent patterns of intermediary metabolism that cannot be explained completely by any one hypothesis but that imply significant dose-dependent effects of ethanol upon intermediary metabolism, not directly related to NADH production. It is suggested that the amount of ethanol ingested at one time may be an important variable in the pathology of alcoholism.

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3913 GLYCYLPROLYL β-NAPHTHYLAMIDASE ACTIVITIES IN SERUM, LIVER AND KIDNEY OF RATS IN CHRONIC CARBON TETRACHLORIDE INTOXICATION.

(Eng.) Hino, M.; Fuyamada, H.; Nagatsu, T.; Kurokawa, S.; Okuyama, S. (Sch. Dentistry, Aichi-Gakuin Univ., 2-11 Suemori-dori, Chikusa-ku, Nagoya 464, Japan). *Clin. Chim. Acta* 67(1):103-105; 1976.

Glycylprolyl β-naphthylamidase activities were measured in the serum, liver, and kidney of rats with carbon tetrachloride-induced (0.15 ml/100 g of a 50% solution, twice weekly) hepatic injury to determine if the elevated serum levels of this enzyme, seen in hepatobiliary diseases, are caused by release of this enzyme. Serum glycylprolyl β-naphthylamidase activity increased about 1.8-fold at 1 week of CCl_4 treatment, about 2.5-fold at 8 weeks, and remained high throughout the 16-week observation period. In contrast, the activity in the liver decreased significantly at 2 hr after the first CCl_4 administration, and after 8 weeks, it was about 67% of the normal value. Although the glycylprolyl β-naphthylamidase activity was high in the kidney, it did not change significantly during the first 12 weeks; a slight but significant decrease occurred at 16 weeks. The results indicate that the elevated serum levels of glycylprolyl β-naphthylamidase in hepatobiliary injury may be mostly derived from the liver.

3914 REGENERATION IN RAT LIVER INJURED BY CARBON TETRACHLORIDE.

(Eng.) Rosenkranz, E.; Charters, A. C., III; Orloff, M. J. (Univ. California, San Diego, Sch. Medicine, La Jolla, CA). *Surg. Forum* 26:411-412; 1975.

Liver regeneration was studied after 70% hepatectomy in 20 male Long-Evans rats treated with 10% CCl_4 (1 ml, i.m., on alternate days, 20 doses). The animals were given ^{3}H-thymidine (100 μCi, i.p.) 24 hr after hepatectomy, and were killed 2 hr later. Normal livers from 15 control animals showed no significant cellular mitotic activity prior to hepatectomy. The CCl_4-injured livers demonstrated active regeneration, with a mean of 9.2 mitoses per 100 high-power fields (hpf). This mitotic activity was confined to islands of relatively healthy-appearing hepatocytes. After hepatectomy, there was a marked increase in the indices of regeneration in both groups. The regenerative response to partial hepatectomy in the CCl_4-injured liver was significantly less than that in the normal liver (56.8 mitoses/100 hpf, 1,089 labeled nuclei/100 hpf, and 4,804 counts/min thymidine uptake in normal rats and 31.9 mitoses/100 hpf, 495 nuclei/100 hpf, and 1,103 counts/min in the CCl_4-treated rats). The periportal distribution of mitotic activity in the injured liver prior to and after hepatectomy suggests that regeneration is influenced by a humoral factor in portal blood.

3915 INHIBITION OF DRUG METABOLIZING ENZYMES BY DIAZEPAM IN RAT LIVER.

(Eng.) Vorne, M.; Idanpaan-Heikkila, J. (Dept. Pharmacology, Univ. Oulu, Oulu, Finland). *Experientia* 31(8):962-963; 1975.

The effect of diazepam on the activity of drug metabolizing enzymes was studied in 24 male Sprague-Dawley rats. The possibility that diazepam may stimulate its own metabolism and thus explain the development of tolerance to it was also studied. One group of six rats received diazepam in the diet (100 mg/day for 6 days). Two other groups were given phenobarbital or 3,4-benzpyrene (80 and 20 mg/kg, resp.) for the same length of time, and the remaining six animals served as controls. Diazepam had no significant effect on the content of cytochrome P-450 or *N*-demethylation on methylaniline. Diazepam decreased the oxidation of hexobarbital to 67% of controls and the reduction of *p*-nitrobenzoic acid to 59% of controls. 3,4-Benzpyrene had no effect on diazepam metabolism, although phenobarbital increased the rate of metabolism of diazepam (14.92 nmol of substrate and metabolites recovered after incubation) over that of controls (28.10 nmol). Diazepam had no effect on its own metabolism; this is similar to previous findings with prazepam but different from findings with chlordiazepoxide. It is likely that the benzodiazepines differ from each other with regard to their effect on drug metabolizing enzymes.

3916 EFFECTS OF CYCLOHEXIMIDE ON PROTEIN DEGRADATION AND GLUCONEOGENESIS IN THE PERFUSED RAT LIVER.

(Eng.) Woodside, K. H.

(Milton S. Hershey Medical Center, Pennsylvania State Univ., Hershey, PA 17033). *Biochim. Biophys. Acta* 421(1):70-79; 1976.

Intracellular amino acid levels were measured in perfused Lewis rat livers following treatment with cycloheximide to determine the role of amino acids in the inhibition of proteolysis by cycloheximide. Cycloheximide at concentrations above 18 μM produced a 93% inhibition of total protein synthesis measured by valine incorporation in the perfused liver. Rates of protein degradation were estimated by perfusing livers prelabeled *in vivo* with L-[1-^{14}C]-valine with medium containing 15 mM L-valine. Thus, labeled valine released from liver protein during perfusion was greatly diluted, and reincorporation of label was minimized. Cycloheximide at 18 μM inhibited protein degradation by over 60% after a delay of 15-20 min. Associated with these effects were dose-dependent increases in the rates of glucose and urea production. Glucose production increased threefold, from 0.54 in control to 1.85 μmol/min/100 g rat in cycloheximide-treated livers. Urea production increased from 0.24 to 0.62 μmol/min/100 g rat. No changes in liver glycogen or cyclic AMP content were observed. The data suggest that inhibition of protein synthesis provides an increased availability of intracellular amino acids and that many of these are rapidly degraded, yielding urea and glucose. This is supported by the fact that intracellular alanine levels were significantly increased following cycloheximide treatment. It is possible that the inhibition of protein degradation by cycloheximide is due to altered intracellular pools of amino acids or their metabolites.

3917 EFFECT OF PREGNENOLONE-16α-CARBONITRILE ON THE RAT LIVER. (Eng.) Kourounakis, P.; Szabo, S.; Selye, H. (Institut de medecine et de chirurgie experimentales, Universite de Montreal, C. P. 6128, Montreal 101, Quebec, Canada). *Arzneim. Forsch.* 26(1):74-75; 1976.

The effect of pregnenolone-16α-carbonitrile (PCN, 20 μmoles/100 g, p.o., twice daily for 3 days) on the livers of female Charles River CD rats was investigated. PCN caused a 17% increase in liver weight, a 26.3% increase in ATP, a 12.3% increase in protein content, a 76% increase in total lipid constituents, and a 16.7% increase in phospholipids. The increased ATP concentrations show that PCN influences the synthesis of energy-yielding metabolites; this increase may be related to the enhanced bile flow observed after PCN treatment. PCN did not alter body weight, or water, ash, triglyceride, or cholesterol levels in the liver.

3918 EFFECTS OF SECRETIN AND CHOLECYSTOKININ ON RELATIVE COMPOSITION OF HEPATIC BILE IN RHESUS MONKEYS. (Eng.) Gardiner, B. N.; Conaway, C.; Small, D. M. (Univ. California San Francisco, Sch. Medicine, San Francisco, CA). *Surg. Forum* 26:437-439; 1975.

The influence of cholecystokinin and secretin on the relative composition and ability of bile to solubilize cholesterol was studied in three cholecystectomized female rhesus monkeys. Increasing i.v. doses of secretin increased the amount of bile salt present relative to the amount of both cholesterol and phospholipid; a maximal response to secretin was obtained at 5 U/kg/hr, changing the relative composition from 82.9% bile salt to 89.3%, from 2.6% cholesterol to 1.9%, and from 14.3% phospholipid to 8.9%. Hourly secretion of bile salt from the liver was increased 149% above control by secretin, and phospholipid secretion was increased 41%. These changes were accompanied by a steadily increasing output of pancreatic bicarbonate. Increasing doses of cholecystokinin also produced a linear change in the relative composition of bile; the maximal response occurred at 2.3 U/kg/hr, increasing the relative proportion of bile salt from 82.4 to 88.1% and decreasing the proportion of phospholipid from 15.5 to 9.8%. At this concentration of cholecystokinin, bile salt secretion was increased 69% above control; cholesterol, 51.6%, and phospholipid, 32.2%. These changes were accompanied by a linear increase in pancreatic protein secretion. The changes in the relative composition of bile produced by secretin, and possibly by cholecystokinin, are potentially important, since they improve the cholesterol-holding capacity of bile.

3919 GLUTATHIONE REDUCTASE ACTIVITY IN SERUM AND LIVER TISSUE OF HUMAN AND RAT WITH HEPATIC DAMAGE. (Eng.) Kumata, H.; Wakui, K.; Suzuki, H.; Sugawara, T.; Lim, I.; Otsuki, M.; Ozeki, T.; Miura, K.; Yamagata, S. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 116(2):127-132; 1975.

Glutathione reductase activity of both serum and liver tissue homogenates was measured in 4 normal controls and in 29 patients with hepatic parenchymatous diseases. The results were compared with those from experiments with male Donryu rats in which hepatic damage had been produced by administration of CCl_4 (0.02 mg/100 g body weight, i.p.). The human specimens were taken by needle biopsy at laparoscopy. In the four healthy subjects, liver glutathione reductase (LGR) was 6.0 ± 2.0 U, which showed a statistically significant correlation with liver GOT (LGOT) and liver GPT (LGPT) ($p<0.01$ in both). The LGR was 29.6 ± 21.1 U in 14 patients with acute hepatitis, 13.5 ± 5.5 U in 11 patients with chronic hepatitis, and 22.0 ± 12.5 U in 4 patients with liver cirrhosis. Statistically significant correlations were found between LGR and LGOT in acute hepatitis ($p<0.1$) and LGR and LGPT in liver cirrhosis ($p<0.1$). In CCl_4-treated rats, the SGR activities at 6, 12, 24, and 36 hr after injection were 102.8 ± 10.1, 86.4 ± 23.4, 64.0 ± 10.1, and 52.4 ± 8.6 U/ml, resp. The LGR activities in CCl_4-treated rats were 93.6 ± 6.0, 94.8 ± 8.2, 92.0 ± 13.4, and 83.4 ± 9.6 U/mg at 6, 12, 24, and 36 hr, resp., after injection. A significant correlation was found between LGR and LGOT activities at 6 hr after CCl_4 injection ($p<0.05$). The results demonstrate that the mechanism of the elevation of SGR in liver damage is different from that of the leaking enzymes that are liberated from the liver in liver damage. It is also noted that changes in glutathione reductase activities in serum and liver occur in the early stages of liver damage.

3920 BLOOD VOLUME PARTITION AFTER ACUTE CHOLESTASIS IN THE RAT. (Eng.) Aarseth, P.; Aarseth, S.; Bergan, A. (Inst. Physiology, Univ. Oslo, Karl Johans Gate 47, Oslo 1, Norway). *Eur. Surg. Res.* 8(1):61-70; 1976.

A method involving ^{51}Cr-labeling of RBC and ^{125}I-labeling of serum albumin and rapid freezing of intact rats was used to evaluate the blood content in liver, spleen, and gastrointestinal (GI) tract in cholestatic male Wistar rats. For comparison, the lungs were also examined. After 4 days of cholestasis, experimentally induced by bile duct ligation, the animals were hypovolemic; their blood volume was 12.8 ml and large vessel hematocrit was 47%, as opposed to 14.5 ml and 44%, resp., in sham-operated controls. At this time, the livers of the sham-operated animals contained 2.1 ml of blood or 14.6% of their total blood volume; the livers of cholestatic animals contained 1.9 ml ($p<0.036$), a small increase in absolute terms. After 7 days of cholestasis, the liver contained 2.6 ml of blood, an increase in both relative ($p<0.016$) and absolute ($p<0.009$) terms. The GI blood content was increased over the control level (0.7 ml) at both 4 days (0.8 ml) and 7 days (0.9 ml, $p<0.036$), while the splenic blood content was unchanged or slightly reduced. Four days after the induction of cholestasis, when the animals were dehydrated, the pulmonary blood volume was reduced by 0.8 ml ($p=0.001$). When the total blood volume was normalized 3 days later, the pulmonary blood volume was increased by 0.3 ml but was still markedly reduced compared to controls ($p=0.04$). The total body hematocrit, calculated from the distribution volumes for labeled RBC and plasma albumin, changed in accordance with the measured hematocrit in large vessel blood. In the GI tract and lungs, the dynamic hematocrits increased relative to the large vessel hematocrit after 4 and 7 days of cholestasis ($p<0.018$). The liver hematocrit was high in the sham-operated animals (103% of total body hematocrit), but decreased markedly (87-88% of total body hematocrit, $p=0.002$) in the cholestatic groups. In sham-operated animals, the dynamic hematocrit of the spleen was 172% of the total body hematocrit, and in the cholestatic animals it was 141 and 152% on days 4 and 7, resp. It is suggested that during cholestasis, the depot function of the splanchnic vessels is disturbed. This might be one factor in the development of the hepatorenal syndrome.

3921 EFFECT OF PHOSPHOLIPID ON THE RELEASE OF BETA-LIPOPROTEIN IN OROTIC ACID-INDUCED FATTY LIVER. (Eng.) Negishi, I.; Aizawa, Y. (Tokyo Coll. Pharmacy, Sinjuku-ku, Tokyo, Japan). *Chem. Pharm. Bull. (Tokyo)* 23(9):1928-1931; 1975.

The content of liver lipids and protein and of serum β-lipoprotein was determined in female Wistar rats fed orotic acid and in controls. Further, the effect of phosphatidylcholine on the release of β-lipoprotein from liver slices into the incubation medium was examined in both groups. Liver glycerides were increased 1,030% in rats fed orotic acid over controls, but liver phospholipid was only 68% of controls, and protein was only 76.8% of controls. A 50% depression of the content of serum β-lipoprotein was observed in rats fed orotic acid. The release of β-lipoprotein from liver slices decreased when orotic acid was added to the diet. This decrease was partly restored by the addition of phosphatidylcholine (50 μg P/ml). When liver slices were pretreated with phospholipase C (250 μg/ml), the amount of released β-lipoprotein increased in both control and orotic acid-fed rats. By the addition of phosphatidylcholine, the treated liver slices from orotic acid-fed rats released the same amount of lipoprotein as controls. Because phosphatidylcholine appears to take part in the release of β-lipoprotein, fatty liver induced by orotic acid must have resulted from the impaired phosphatidylcholine synthesis in the liver.

3922 INDUCTION OF CHRONIC LETHAL AUSTRALIA ANTIGEN HEPATITIS IN MICE. (Eng.) Johnson, L. A.; Wirostko, E. (Columbia Univ. Coll. Physicians Surgeons, 630 West 168th St., New York, NY 10032). *Am. J. Pathol.* 82(1):85-94; 1976.

A possible cause of the uveitis in six patients havin concurrent chronic iridocyclitis and chronic active hepatitis with serum Australia antigen (AA) was investigated. The aqueous humor from each patient was analyzed for AA, passed through 220-mμ filters, and inoculated directly into the livers of male CD-1 mice. The animals were observed for spontaneous mortality for 12 months, at which time the remaining animals were sacrificed. The livers of all animals were examined for hepatitis and AA. Although the aqueous humor from only one patient contained AA, all six aqueous specimens produced a lethal viral hepatitis-like disease with liver AA. The results suggest that the six positive aqueous specimens contained a viral infectious agent, which may have been the core of the Dane particle, and that the mouse is suitable for the laboratory investigation of type B hepatitis by the technique described.

3923 HEPATIC KUPFFER CELL DYSFUNCTION DURING HEMORRHAGIC SHOCK. (Eng.) Loegering, D. J.; Saba, T. M. (Albany Medical Coll., Albany, NY 12208). *Circ. Shock* 3(2):107-113; 1976.

Humoral and cellular aspects of reticuloendothelial system (RES) function were studied in anesthetized male dogs during hemorrhagic shock. Dogs that were subjected to the hemorrhagic shock to a mean arterial blood pressure of 40 mm Hg, showed a 65% depression in phagocytic index at both 5% and 30% uptake of the maximal shed blood volume. As demonstrated by a standard colloid clearance technique, this depression in RES function was due primarily to a reduction in hepatic Kupffer cell phagocytosis and, to a lesser extent, to a reduction in spleen uptake of the injected colloid. Localization of the colloid in the lung increased at 5% uptake and did not differ significantly from control at 30% uptake of the maximal shed volume. Circulating opsonic activity showed a large (37%) decrease at 5% uptake and returned to prehemorrhage levels at the 30% uptake point, even though continued RES depression existed. These data suggest that RES function depression during the early stages of hemorrhagic shock may be mediated, in part, by a depletion of circulating opsonic activity. In contrast, other factors, such as cellular disturbances and/or circulatory alterations appear to mediate Kupffer cell dysfunction during the later stages of hemorrhagic shock.

3924 SPLENIC ARTERY LIGATION IN SELECTED PATIENTS WITH HEPATIC CIRRHOSIS AND IN SPRAGUE-DAWLEY RATS. (Eng.) Witte, C. L.; Witte, M. H.; Renert, W.; O'Mara, R. E.; Lilien, D. L. (Univ. Arizona Coll. Medicine, Tucson, AZ). *Surg. Gynecol. Obstet.* 142(1):1-12; 1976.

The effects of splenic artery ligation were studied in Sprague-Dawley rats and in eight selected symptomatic patients with hepatic cirrhosis. Twenty-five animals underwent ligation; five rats were sacrificed at weekly intervals for 1 month and the final five at 3 months. Fifteen other rats served as sham-operated or unoperated controls. Ligation in rats induced splenic infarction, reduced functional splenic mass, transiently raised platelet and reticulocyte counts, and was without local complications. In seven selected patients with cirrhosis and prominent splenomegaly, the splenic artery was markedly enlarged, splenic arterial flow was greatly increased, and splenic artery ligation partially lowered portal pressure. In three patients with varying cytopenias secondary to hypersplenism, splenic artery ligation uniformly improved peripheral blood elements, although varying degrees of hypersplenism later recurred necessitating splenectomy in one. Splenic artery ligation was performed in four of five other patients in conjunction with coronary vein ligation for bleeding esophageal varices. Two patients later required portacaval shunting and one other, in whom operation was undertaken in desperation, died of hepatic failure. Celiac-mesenteric arterioportography, operative portography, hemodynamic measurements, and examination of peripheral blood elements in these eight patients suggested that splenic artery ligation, in conjunction with coronary vein ligation, has several potentially beneficial effects. Each of these effects and their interrelations require further study before this operation assumes a larger role in the treatment of complications of portal hypertension.

3925 EFFECT OF PORTACAVAL SHUNT AND ACUTE HEPATIC ISCHEMIA ON BRAIN AND LIVER SEROTONIN AND CATECHOLAMINES. (Eng.) Reichle, R. M.; Reichle, F. A. (Temple Univ. Health Sciences Center, Philadelphia, PA). *Surg. Forum* 26:413-414; 1975.

Brain serotonin and dopamine levels were assayed 4 hr after acute hepatic ischemia (AHI) was induced in 40 male Sprague-Dawley rats; serotonin concentration was also determined in ischemic and nonischemic livers. Portacaval shunt (PCS) was performed in 40 rats by rapid cuff anastomosis. AHI was produced in 10 animals 24 hr after hepatic artery ligation and in 20 animals 21 days after PCS. AHI consistently produced tremors, progressive lethargy, and coma. Brain serotonin was significantly higher whether AHI was produced 24 hr after PCS (0.79 ± 0.03 μg/g in sham-operated controls and 1.19 ± 0.01 μg/g in AHI animals, $p<0.01$). By comparison, brain serotonin levels were not significantly changed compared to controls 21 days after PCS (without AHI). A slight increase in brain dopamine 3 weeks after PCS in AHI animals (1.24 ± 0.33 μg/g) over controls (0.98 ± 0.22 μg/g) was statistically insignificant. The hepatic serotonin concentration was significantly increased after AHI (19.4 ± 1.9 μg/g) over that in sham-operated controls (7.4 ± 0.6 μg/g); intrahepatic dopamine concentration was unchanged after AHI. Alterations in cerebral concentration of these compounds in AHI suggest an etiologic association between increased cerebral concentration of neurally active amines and the observed cerebral dysfunction that consistently occurs in this model of AHI.

3926 SPECIFIC ENDOCRINE AND HORMONAL RECEPTOR CHANGES ASSOCIATED WITH LIVER REGENERATION IN ADULT RATS. (Eng.) Leffert, H.; Alexander, N. M.; Faloona, G.; Rubalcava, B.; Unger, R. (Cell Biology Lab., Salk Inst., P.O. Box 1809, San Diego, CA 92112). *Proc. Natl. Acad. Sci. USA* 72(10):4033-4036; 1975.

Plasma levels of insulin, glucagon, and thyroxin were measured 0-24 hr after partial hepatectomy in male Fisher rats, and the capacity of plasma membranes derived from regenerating liver to bind peptide hormones was also measured. Within 3 hr after 70% hepatectomy, insulin levels fell, whereas glucagon levels rose; these changes were not observed in control rats that underwent laparotomy and liver manipulation. Thyroxin and glucose levels were also reduced, but reduction did not begin until 5 and 7 hr, resp., after partial hepatectomy. In separate experiments, the alterations in pancreatic hormone levels began 20 min after 70% hepatectomy (insulin 20 μU/ml at time 0 and 12 μU/ml after hepatectomy; glucagon 186 pg/ml at time 0 and 680 pg/ml after hepatectomy). Experiments with animals that received either 0, 10, 30, 50, or 70% hepatectomy showed that the plasma hormonal changes were proportional to the quantity of liver tissue excised. Plasma membrane preparations from 24-hr regenerating liver bound 40-60% less ^{125}I-labeled glucagon than preparations derived from sham or unoperated rats, whereas ^{125}I-labeled insulin binding was not detectably altered. Membrane-associated endogenous glucagon probably does not explain the diminished glucagon binding, because each group of membrane preparations contained equivalent trace amounts of endogenous immunoreactive glucagon (0.20-0.25 pg/mg protein). Hepatic plasma membrane preparations obtained 24 hr after laparotomy or after partial hepatectomy had similar amounts of 5'-nucleotidase activity (4.75 and 4.25 μmol 5'-AMP hydrolyzed/mg protein/hr, resp.), suggesting that a simi-

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lar plasma membrane fraction had been recovered under different experimental conditions. These experiments indicate that the liver participates in the regulation of circulating blood levels of hormones that are implicated in controlling hepatic proliferation and that liver regeneration induced by partial hepatectomy is accompanied by specific alterations at the level of the plasma membrane and/or hormonal membrane receptors.

3927 EFFECTS OF THE LIVER HOMOGENATE OBTAINED FOLLOWING PARTIAL HEPATECTOMY ON CIRRHOSIS OF THE LIVER.

(Eng.) Seres-Sturm, L.; Maros, T.; Lakatos, O.; Seres-Sturm, M.; Mody, E.; Blazsek, V. (Inst. Anatomy, Medical Univ., Str. Gh. Marinescu nr. 38, Tirgu-Mures, Rumania). *Exp. Pathol. (Jena)* 11(5/6):215-218; 1975.

The influence of liver homogenates on CCl_4-induced liver cirrhosis was investigated in male albino rats. The rats received 0.1-0.2 ml/100 g of a mixture containing CCl_4 plus Oleum Helianthi, i.m., twice weekly for 6 months. During the 6-week experimental period, all animals continued to receive CCl_4 once weekly. The histological and biochemical findings from 17 rats receiving CCl_4 and a normal lyophilized liver homogenate (10% isotonic solution of 3,500 x *g*/20 min supernatants; 0.2 ml/100 g, i.m., 3 times weekly) were similar to those from control animals after 6 months of treatment with CCl_4 alone. In 20 animals receiving CCl_4 and homogenate collected from rats 48 hr after partial hepatectomy, the cirrhotic changes were similar to both controls and animals receiving normal homogenate, but there was also a moderate hyperplasia of the parenchymal nodules and an increase in hepatocyte DNA concentration (cirrhotic controls=377.2 mg/100 g liver; rats receiving homogenate=523.2 mg/100 g). These results indicate that this liver homogenate stimulated the regeneration of the parenchymal cells. In 20 rats receiving CCl_4 and homogenate prepared from the residual liver at 7 days after partial hepatectomy, the lobular architecture was relatively well preserved. The connective tissue was much diminished, and only very slight dystrophic changes were present. There was a significant decrease in collagen (449 mg/100 g in cirrhotic control livers; 294.4 mg/100 g in livers of animals receiving homogenate) and an increase in liver DNA (443 mg/100 g). It appears that rat liver homogenate collected 7 days (postmitotic period) after partial hepatectomy causes the regression of lesions in advanced cirrhosis.

3928 STIMULATION OF ALBUMIN SYNTHESIS BY AMINO ACIDS FOLLOWING PARTIAL HEPATECTOMY IN THE RAT.

(Eng.) Kirsch, R. E.; Lloyd, E. A.; Frith, L. O.; Gordon, B.; Saunders, S. J. (Univ. Cape Town, Medical Res. Council Liver Res. Group, Cape Town 7900, South Africa). *Am. J. Clin. Nutr.* 28(12):1412-1415; 1975.

The role of amino acid supplementation on albumin synthesis following partial hepatectomy was studied in male Wistar rats. The amino acids were in the L-form and consisted of a mixture of arginine (19.30 mg), asparagine (14.40 mg), isoleucine (6.68 mg), leucine (12.91 mg), lysine (29.21 mg), methionine (5.17 mg), phenylalanine (7.75 mg), proline (31.63 mg), threonine (16.52 mg), tryptophan (3.99 mg), and valine (13.07 mg). Immediately following the completion of hepatectomy, some animals received the mixture dissolved in 2 ml of water via nasogastric tube over a period of 1-2 min; this was repeated the next day. When the results were expressed as mg/hr/300 g of rat, the albumin synthesis rates in the hepatectomized rats, with and without the amino acid mixture, was significantly lower than in sham-operated animals (4.89 and 7.03 mg/hr/300 g in partial hepatectomy and partial hepatectomy + amino acid animals, resp.; 10.18 and 9.28 mg/hr/300 g in sham-operated and sham + amino acid animals, resp.) Of the two groups of hepatectomized rats, those receiving amino acid supplements synthesized significantly more albumin. When the results were expressed differently, however, the partially hepatectomized rats and sham-operated rats had similar synthesis rates (3.07 and 3.43 mg/hr/g dry liver weight, resp.), while the hepatectomized rats receiving amino acids synthesized significantly greater amounts of albumin (4.31 mg/hr/g). The authors suggest that amino acid supplementation may enhance albumin synthesis via the release of hormones.

3929 AN INVESTIGATION OF THE HEPATOTOXICITY OF D-GALACTOSAMINE IN DIFFERENT SPECIES OF ANIMAL.

(Eng.) James, G. W. L.; Pickering, R. W.; Parker, F. L. (Dept. Pharmacology, Roussel Labs. Ltd., Swindon, Wiltshire, England). *Arzneim. Forsch.* 25(10):1593-1594; 1975.

The hepatotoxicity of d-galactosamine was investigated in male golden hamsters and T.O. mice. In the hamsters, i.p. doses of 200, 400, and 800 mg/kg of galactosamine resulted in increased SGOT (mean 92, 1894, and 4229 U/l, resp.) and SGPT (133, 2358, and 3420 U/l, resp.) levels within 48 hr, in comparison to controls (SGOT, 63 U/l; SGPT, 50 U/l). These increases were associated with liver cell damage in the two highest doses. Single doses of 400 and 800 mg/kg were more severely hepatotoxic when assessed at 48-72 hr than at 24 hr. The toxicity appeared to be maximum at 48-72 hr. The mice received one i.p. dose of 1,000, 1,250, or 1,500 mg/kg of galactosamine; two doses of 500, 600, or 750 mg/kg over a period of 48 hr; or three doses of 300, 400, or 500 mg/kg over 48 hr. Galactosamine at 1,250 mg/kg marginally increased serum transaminase levels when given as a single dose or when divided into two or three doses totaling 1,200 mg/kg; the SGOT levels were 482, 322, and 436 U/l for the single, double, and triple doses, resp. (control, 91 U/l), and the SGPT levels were 38, 59, and 237 U/l, resp. (control, 13 U/l). Doses of 1,500 mg/kg given as a single dose or divided into two doses gave a similar marginal increase in serum transaminase levels, but administration in three doses resulted in greater increases (SGOT, 1825 U/l; SGPT, 1134 U/l). From a plot of the dose of galactosamine versus the resulting increase in SGOT values in rats (previously reported), mice, and hamsters, the order of susceptibility is golden hamster > rat > mouse.

3930 NEWLY SYNTHESIZED HEPATIC CHOLESTEROL AS PRECURSOR FOR CHOLESTEROL AND BILE ACIDS IN RAT BILE.

(Eng.) Normann, P. T.; Norum, K. R. (Dept. Biochemistry, Inst. Nutrition Res., Univ. Oslo, Oslo, Norway). *Scand. J. Gastroenterol.* 11(4):427-432; 1976.

The origin of cholesterol and bile acids in the bile was studied using radioactively-labeled cholesterol and mevalonate. The two labeled compounds were added to serum, and 1 ml of this serum (containing 100 mCi DL-mevalonate-5-^{3}H and 2.3 mCi cholesterol-4-^{14}C) was injected into male Wistar rats anesthetized with sodium pentabarbitol. Bile was collected via a catheter at 15 min intervals. The specific activity (sp. ac.) of free and esterified cholesterol was calculated after determining the amounts of cholesterol by gas-liquid chromatography and radioactivity in a liquid scintillation spectrophotometer. The sp. ac. of bile acids was determined following liquid scintillation counting and enzymatic procedure. Bile cholesterol had the highest sp. ac. The sp. ac. of liver cholesterol was higher than that of serum cholesterol for the first 90 min, due probably to the liver's dominant role in cholesterol synthesis. The sp. ac. of chenodeoxycholic acid was higher than that of cholic acid, indicating higher incorporation of labeled compounds (ratio of 1:10). The decreasing ratio of ^{3}H/^{14}C labeled bile acids indicated that newly synthesized liver cholesterol was utilized preferentially as a precursor of bile acids. The same was true for bile cholesterol. The use of pentabarbitol (which lowers 12-α-hydroxylation) could have influenced the higher production of chenodeoxycholic acid relative to cholic acid. These findings are consistent with the assumption that unesterified cholesterol (and not esterified) is the immediate precursor for bile acids. The authors conclude that it is probably that the liver production of bile constituents is so organized that secreted products derive from an anabolic pool, and not from a catabolic pool.

3931 THE TOXICITY OF THIOXANTHENE NEUROLEPTICS TO ISOLATED RAT LIVER CELLS.

(Eng.) Aber-athy, C. O.; Zimmerman, H. J. (Liver Res. Unit, eterans Admin. Hosp., Washington, DC 20422). *Proc. oc. Exp. Biol. Med.* 150:385-389; 1975.

he hepatotoxicity of variously substituted thioxanhenes was compared to that of the structurally-imilar phenothiazine analogs using isolated liver ells. The cells were obtained from male CD rats. he drug solutions were added to the cell suspensions nd incubated at 37 C for 30 min. Samples of the edia were analyzed for the level of GOT; cell eakage of GOT was taken to be a measure of toxicity. ll the thioxanthenes examined caused leakage of OT, with the exception of N-710. The most potent as SKF10812, which caused leakage at 3 x 10^{-5} M. oth isomers of chlorprothixene and N-756A caused ignificant leakage at 6 x 10^{-5} M, while the two somers of flupenthixol caused leakage at 8 x 10^{-5} M. anthiol and methixene (also thioxanthenes) produced OT leakage at 9 x 10^{-5} and 2 x 10^{-4} M, resp. The somers of clopenthixol and N-716 caused leakage at x 10^{-4} M. Thioxanthenes with side chains attached by saturated C-C bonds produced less leakage than analogs with unsaturated C-C bonds, suggesting that the rigidity produced by the double bond may be of some importance in this phenomenon. The trifluoromethyl substituted thioxanthenes were three to four times more potent than their halogenated analogs. A dimethylaminopropylidene side chain was associated with five to six times as much GOT leakage as a side chain of hydroxyethylpiperazinylpropylidene. Some thioxanthenes were more potent than their phenothiazine analogs. Toxicity was not related to neuroleptic properties.

3932 INVESTIGATIONS ON THE PATHOGENESIS OF EXPERIMENTAL CHRONIC ACTIVE HEPATITIS (CAH) IN RABBITS.

(Ger.) Hopf, U.; Meyer zum Buschenfelde, K. H. (II. Med. Univ.-Klinik, D-6500 Mainz, Langenbeckstrasse 1, Germany). *Z. Gastroenterol.* 13(3):398-403; 1975.

The role of cellular and humoral immune reactions to human liver-specific protein (HLP) and allogeneic liver-specific protein (RLP) in the induction of hepatic lesions was studied in six groups of White New Zealand rabbits that received: (group 1) 41 injections (25 mg each) of HLP + complete Freund's adjuvant (CFA), i.p., over 143 weeks; (group 2) 26 injections (25 mg each) of HLP + CFA, i.p., over 18 weeks, followed by immunization with RLP + CFA as in group 1; (group 3) 26 injections (25 mg each) of HLP + CFA, i.p., alternated with the same dose of RLP, i.p., without CFA 1 day after the HLP injection; (group 4) 25 injections (5 mg each) of HLP + CFA, i.p., over 68 weeks; (5) HLP + CFA, i.p., as in group 4 alternated with 1-mg injections of RLP, i.v., 1 day before each HLP injection; and (group 6) controls given only CFA, i.p. Chronic active hepatitis (CAH) or cirrhosis and a positive skin reaction to RLP were found in all but one animal in group 1. Positive skin tests for RLP were obtained after 14 weeks in four of nine rabbits in group 2. All animals surviving 23 weeks had CAH. CAH was also found in two of eight rabbits in group 3; the skin test for RLP was still negative after 14 weeks in six of eight animals. The humoral immune reaction did not differ from that in groups 1 and 2. CAH was found in 7 of 11, and cirrhosis in 1 of 11 rabbits in group 4 after 70 weeks. The cellular immune reaction to RLP developed significantly later than in groups 1-3, and the antibody titer was significantly lower. CAH was found in 1 of 12 animals in group 5. Slightly positive cellular immune reaction to RLP was found in two animals. The RLP antibody titer did not differ appreciably from that in group 4. The findings indicate the possibility of CAH or cirrhosis induction in rabbits by long-term immunization with HLP, and that the autoimmunity to liver-specific antigens induced by HLP immunization can be maintained by allogeneic liver-specific proteins.

3933 THE EFFECT OF SILYMARIN-N-METHYLGLUCAMINE SALT AND SILYBIN-DIHEMISUCCINATE ON (1-^{14}C)-ACETATE INCORPORATION IN RAT LIVER LIPIDS.

(Ger.) Schriewer, H.; Rauen, H. M. (Physiologisch-Chemisches Institut, Westfaelische Wilhelms-Universitat, 44 Munster, Waldeyerstr. 15, W. Germany). *Arzneim. Forsch.* 26(2):235-238; 1976.

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3957 ANALYSIS OF INHIBITION IN PATHWAYS OF NADPH$_2$ OXIDATION IN LIVER TISSUE MICROSOMES. (Rus.) Archakov, A. I.; Zhirnov, G. F.; Karusina, I. I. (N. I. Pirogov Second Moscow Medical Sch., Moscow, USSR). *Vopr. Med. Khim.* 21(3):281-286; 1975.

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3962 THE ROLE OF ESTROGENS IN PHENOBARBITONE-SODIUM SALT INDUCTION OF MICROSOMAL ENZYMES OF THE LIVER. (Rus.) Sergeev, P. V.; Vedernikova, N. N.; Maiskii, A. I.; Shapoval, N. V.; Volov, V. A. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Biull. Eksp. Biol. Med.* 80(9):43-45; 1975.

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3966 STUDIES ON THE CHOLAGOGUE AND CHOLERETIC EFFECT OF JUICE FROM CELERY. (Bul.)
Tashev, T.; Grancharov, V. (Dept. Gastroenterology and Dietetics, ISUL, Bulgaria). *Suvrem. Med. (Sofia)* 25(10):7-11; 1974.

See also, 3827.

SECRETION AND METABOLISM

Intestine

3967 THE ASSOCIATION BETWEEN ACIDIFICATION AND ELECTROGENIC EVENTS IN THE RAT PROXIMAL JEJUNUM. (Eng.) Lucas, M. L. (Max-Planck Institut fur Biophysik, Kennedyallee 70, Frankfurt am Main, W. Germany). *J. Physiol. (Lond.)* 257(3):645-662; 1976.

Simultaneous measurement of hydrogen ion production, transmural potential difference, and intermittent short circuit current (SCC) was made in the rat proximal jejunum *in vitro*. Similarly, potassium and sodium ion movements were measured to investigate the relation of acidification to electrogenic events and associated ion movements in the jejunum. Acidification correlated significantly ($p<0.01$) with the short circuit current, and both were inhibited by 10 mM serosal ouabain or 10 mM mucosal aminophylline. Both inhibitors had effects on net potassium movement but not on net sodium movement. In isotope studies, 10 mM serosal ouabain reduced the J_{ms} sodium flux, and 10 mM mucosal aminophylline had no effect. Thus, aminophylline can reduce both SCC and acidification without perceptibly altering the serosally-directed sodium flux. There was some degree of correlation ($p<0.05$) between serosal potassium movement and acidification, but only when ouabain was present. Mucosal potassium ion movement correlated ($r=0.801$) moderately ($p<0.05$) with acidification, when compared over all experimental conditions, indicating the possibility of potassium hydrogen ion exchange. In the complete absence of the sodium ion, a reversed potential difference occurred, which was not sustained, but fell to zero after an initial peak. Serosal ouabain and mucosal aminophylline appeared to have precisely opposite effects. Ouabain caused an increase and aminophylline, a decrease, in the transient reversed potential differences. A model for acidification based on potassium is proposed to explain these findings.

3968 IN VITRO SYNTHESIS OF IMMUNOGLOBULINS, SECRETORY COMPONENT, COMPLEMENT AND LYSOZYME BY HUMAN GASTROINTESTINAL TISSUES. I. NORMAL TISSUES. (Eng.) Lai A Fat, R. F. M.; McClelland, D. B. L.; Van Furth, R. (Dept. Microbial Diseases, Univ. Leiden, Leiden, Netherlands). *Clin. Exp. Immunol.* 23(1):9-19; 1976.

The ability of human gastrointestinal tissue cultured *in vitro* to synthesize immunoglobulins (Ig) G, A, and M, secretory component (SC), complement proteins, and lysozyme was investigated. Histologically normal tissues were obtained endoscopically and surgically. IgA and SC were produced in all sites, but the relative intensity of IgA and SC synthesis varied. In stomach and small intestine, the intensity of IgA synthesis was greater than that of SC, but in large bowel mucosa, there appeared to be an excess of SC synthesis. Synthesis of IgG and IgM was also found in all sites. Complement proteins were produced by some of the intestinal biopsies, and by the parotid gland. Lysozyme was synthesized in the parotid gland and gastric mucosa and, to a lesser extent, in the small intestine; it was rarely synthesized in the large intestine. The results show that the synthesis of specific proteins can be detected in short term *in vitro* cultures of biopsies obtained from sites throughout the human gastrointestinal tract by standard methods.

3969 THE RELATIONSHIP BETWEEN PEPTIDE-HYDROLASE OF CYTOPLASM AND BRUSH BORDERS OF GUINEA-PIG SMALL-INTESTINAL MUCOSA. (Eng.) O'Cuinn, G.; Fottrell, P. F. (Dept. Biochemistry, Univ. Coll., Galway, Ireland). *Biochem. Soc. Trans.* 3(6):1219-1221; 1975.

Peptide hydrolases released from brush border of guinea pig small intestinal mucosa by sonication, Triton X-100, and papain were compared with cytoplasmic peptide hydrolases from the same tissue. Although six hydrolases have been previously observed in the mucosal cytoplasm, starch-gel electrophoresis of peptide hydrolases, released from brush borders by sonication or Triton X-100, reveale that only two hydrolases were present in this fraction. Their electrophoretic mobilities corresponded to those of the α and β peptide hydrolases of the cy plasm. Occasionally, a third peptide hydrolase was observed, corresponding to the "a" peptide hydrolase of cytoplasm. Similar results were obtained with l concentrations of papain (1 U/20 mg brush border pr tein), although qualitative differences between electrophoretic mobilities of peptide hydrolases of cytoplasm and of brush borders were obtained when higher concentrations of papain (100 U/20 mg) were used. In this case, a tripeptide hydrolase with an electrophoretic mobility corresponding to the β peptide hydrolase of cytoplasm was detected in addition to dipeptide hydrolases similar to the α and β peptide hydrolases of cytoplasm. The authors conclude that this unique tripeptide hydrolase is specifically brush border in location, and that this enzyme probably accounts for the significant proportion of tripeptide hydrolase activity previously detected in the brush border fraction of guinea pig small intestinal mucosa.

3970 PHOSPHOLIPID EXCHANGE PROTEINS IN RAT INTESTINE.

(Eng.) Lutton, C.; Zilversmit, D. B. (Laboratoire de Physiologie de la Nutrition, Faculte des Sciences d'Orsay 91 405, France). *Lipids* 11(1):16-20; 1976.

The existence of proteins that stimulate the exchange of phospholipids between cellular membranes in the intestine was investigated in male Sprague-Dawley rats. Homogenates of liver and intestine were centrifuged at 105,000 x *g* average to sediment cell debris and mitochondria and the pH was adjusted to 5.1. Exchange activity was determined by measuring the transfer of [^{32}P]phosphatidylcholine from liposomes (5 μg phospholipid P) to beef heart mitochondria. With 2, 4, and 8 mg of protein from liver or intestine (105,000 x *g* supernatant), 1.0, 2.0, 3.9 and 0.21, 0.43, 1.0 U, resp., of phosphatidylcholine exchange were found. Expressed per mg of protein in the 105,000 x *g* homogenate, the exchange activity of intestine was about one-fourth that of liver. The phosphatidylcholine exchange activity of the whole small intestine was estimated at 12-15% of whole liver. This active fraction showed the characteristics of a protein. Isoelectric focusing of the intestinal pH 5.1 fraction showed two peaks of phosphatidylcholine exchange activity: one at an acidic pH, the other in a basic pH range. The second peak of activity appeared to be a new phospholipid exchange. Phosphatidylcholine exchange activity was higher in mucosa than in the intestinal wall. No significant differences were found between villi and crypts or between jejunal and ileal villi. Exchange activity per mg of protein in mucosa was unaffected by fasting or by a high fat or high cholesterol diet. This suggests that phospholipid exchange activity in the absorptive cells is not a rate-limiting step in the process of fat absorption.

3971 STUDIES ON THE BRUSH BORDER MEMBRANE OF MOUSE DUODENUM. III. IODINATION OF MEMBRANE PROTEINS.

(Eng.) Billington, T.; Nayudu, P. R. V. (Dept. Zoology, Monash Univ., Clayton 3168, Victoria, Australia). *J. Membr. Biol.* 27(1/2):101-107; 1976.

To identify luminal surface proteins of the microvillus membrane of mouse duodenum, microvillus membranes were iodinated from luminally administered lactoperoxidase, H_2O_2, and ^{125}I before and after neuraminidase treatment. The membranes were isolated, solubilized in sodium dodecyl sulphate buffer, and electrophoresed on gels. The gels were stained for protein, and then sliced for liquid scintillation counting. When the membranes were not treated with neuraminidase, the nonpermeating iodination probe attached only to a band containing protein of 150,000 daltons (approximate molecular weight). This size class of protein may reside on the luminal side of the brush border membrane as opposed to the serosol side. Membranes treated from the luminal side with neuraminidase (to remove masking carbohydrate) and then iodinated, appeared to contain an additional protein of estimated molecular weight 220,000 daltons that was accessible to ^{125}I. A 220,000 dalton protein may also be on the luminal side of the membrane. Membranes were isolated, exposed to iodination, and then solubilized for electrophoresis. Nearly all proteins were labeled, which indicate that there is an asymmetric distribution of proteins in the plane of the membrane. The two smallest molecular weight polypeptides that were not iodinated are proposed to be so disposed in the membrane that they are inaccessible to the probe from either side.

3972 CHANGES OF TISSUE ACETYLCHOLINE IN THE DISTENDED INTESTINE.

(Eng.) Takewaki, T.; Yagasaki, O.; Yanagiya, I. (Faculty Agriculture, Univ. Gifu, Nakamonzen-cho, Kagamihara 504, Japan). *Jpn. J. Pharmacol.* 25(3):223-232; 1975.

The effects of distension of the intestinal wall on the liberation and synthesis of acetylcholine (ACh) were studied in isolated 4-cm segments of guinea pig ileum by measuring the changes in the amount of free and bound ACh. In the presence of 50 μM eserine, longitudinal distension did not increase the amount of free ACh in the intestinal wall, but did increase the amount of bound ACh from 9.7 μg/g to 11.8 μg/g. Circumferential distension or mucosal rubbing increased free ACh but not bound ACh. These effects occurred within 30 sec. In eserine-free medium, the amount of bound ACh was increased in either direction of distension (initially 5.8 μg/g, increased to 7.3 or 7.4 μg/g by longitudinal and circumferential distension, resp.). The addition of over 5×10^{-8} g/ml ACh to the bathing medium completely blocked the distension-induced increase. It is concluded that the release and synthesis of ACh may both be augmented by the circumferential and the longitudinal distension in the physiological conditions. In the presence of eserine, however, the presence of high extracellular ACh levels presumably inhibits the distension-induced augmentation of ACh synthesis in the tissue.

3973 RADIOIMMUNOASSAY STUDIES OF INTESTINAL CALCIUM-BINDING PROTEIN IN THE PIG. II. THE DISTRIBUTION OF INTESTINAL CaBP IN PIG TISSUES.

(Eng.) Arnold, B. M.; Kuttner, M.; Willis, D. M.; Hitchman, A. J. W.; Harrison, J. E.; Murray, T. M. (Dept. Medicine, Univ. Toronto, Toronto, Ontario M5S 1A8, Canada). *Can. J. Physiol. Pharmacol.* 53(6):1135-1140; 1975.

The concentration of calcium-binding protein (CaBP) in the various tissues and organs of normal pigs was measured using a specific radioimmunoassay for porcine intestinal CaBP. Although most of the CaBP was present in the proximal small intestine, lower concentrations were found in other parts of the intestine; the amounts of CaBP decreased distally down the intestine in all six pigs. When duodenal, jejunal, and ileal extracts were assayed at several dilutions, the immunodilution curves were parallel to those seen for pure CaBP, indicating immunochemical similarity. Intestinal CaBP was also found, in lower concentrations, in kidney, liver, thyroid, pancreas, and blood. In all other tissues, including parathyroid, bone, skeletal muscle, and brain, CaBP immunoreactivity was undetectable or was less than in blood. The elution profile of CaBP activity and immunoreactivity from gel filtration analysis of kidney and parathyroid extracts suggests that the CaBP in the parathyroid gland and the major CaBP in the kidney are chemically and immunochemically different from intestinal CaBP.

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3974 RADIOIMMUNOASSAY STUDIES OF INTESTINAL CALCIUM-BINDING PROTEIN IN THE PIG. I. IDENTIFICATION OF INTESTINAL CALCIUM-BINDING PROTEIN IN BLOOD AND RESPONSE TO A LOW CALCIUM DIET. (Eng.) Arnold, B. M.; Kuttner, M.; Swaminathan, R.; Care, A. D.; Hitchman, A. J. W.; Harrison, J. E.; Murray, T. M. (Univ. Toronto, Dept. Medicine, Toronto, Ontario M5S 1A8, Canada). *Can. J. Physiol. Pharmacol.* 53(6):1129-1134; 1975.

The change in the blood calcium-binding protein (CaBP) concentration after adaption to a low Ca diet was investigated in pigs and correlated with changes in intestinal CaBP concentration. Two of four 15-week-old littermate pigs were placed on a low Ca diet (0.15% Ca, 0.65% P), and two were placed on a control diet (0.65% Ca, 0.65% P). After 2 weeks, the entire small intestine was removed and divided into nine 1.8-m segments. The CaBP was assayed in both plasma and intestinal mucosa. The CaBP concentration in unextracted mixed venous plasma from 14 healthy pigs ranged from 28 to 90 ng/ml, which was lower than the concentration in the duodenum by a factor of 10^{-5}. There was an increase in immunoreactive CaBP in both plasma and intestinal mucosa in pigs on a low Ca diet, as compared to controls. There was no increment in immunoreactive CaBP in the first 1.8-m segment of small intestine. A total of 71% of the increment in CaBP occurred distal to the first two segments. The largest fractional increase (over 30 fold) was in the sixth segment, where the concentration increased from 5.5 to 184 μg/g. The mean CaBP concentration for the total small intestine increased by a factor of 1.9, while the plasma CaBP concentration increased by a factor of 2.6. Plasma CaBP was a more reliable indicator of change in CaBP status than was the measurement in the proximal gut segment, which contained the duodenum. It is concluded that the assay of CaBP in blood is convenient and may obviate the sampling errors inherent in intestinal biopsy.

3975 SUBCELLULAR LOCALIZATION OF DIPEPTIDES IN THE SMALL INTESTINE OF ANIMALS. (Rus.) Smirnova, L. F.; Timofeeva, N. M.; Ugolev, A. M. (I. P. Pavlov Inst. Physiology, USSR Acad. Sciences, Leningrad, USSR). *Dokl. Akad. Nauk SSSR* 228(4):992-994; 1976.

See also, 3820, 3838, 3843, 3981.

GENERAL

3976 THE NEURAL CREST AND THE ORIGIN OF THE INSULIN-PRODUCING AND OTHER GASTROINTESTINAL HORMONE-PRODUCING CELLS. (Eng.) Pictet, R. L.; Rall, L. B.; Phelps, P.; Rutter, W. J. (Dept. Biochemistry and Biophysics, Univ. California, San Francisco, CA 94143). *Science* 191(4223):191-192; 1976.

To test the hypothesis that the endocrine cells of the digestive tract derive from the neuroectoderm (neural crest), the entire ectoderm was removed from whole 9-day rat embryos prior to four somites. After the remaining mesoendoderm was cultured for 11 days in Eagle's basal medium (containing 10% embryo extract, 10% mesenchymal factor, and six times the usual amount of amino acid), insulin and B cells in approximately normal proportions were found in every culture in which a pancreas developed (approximately one-fourth of the cases). When mesoendoderm explanted at three somites or less were cultured, the amount of insulin found in the differentiated pancreas was between 0.5 and 2 ng (corresponding to ≈50-200 B cells/pancreas), approximating the normal proportion of insulin and B cells expected at this stage. It is concluded that the endocrine B cells are not derived from the neural crest.

3977 INTESTINAL ATRESIA IN FETAL DOGS PRODUCED BY LOCALIZED LIGATION OF MESENTERIC VESSEL (Eng.) Koga, Y.; Hayashida, Y.; Ikeda, K.; Inokuchi

K.; Hashimoto, N. (Kyushu Univ. Sch. Medicine, Fukuoka City, Fukuoka Prefecture, Japan). *J. Pediatr. Surg.* 10(6):949-953; 1975.

The process of intestinal infarct was investigated histopathologically in 13, 45- to 55-day-old dog fetuses. Ileal atresia and stenosis were produced by a localized ligation of the mesenteric vessels. The intestinal infarct resulted in an aseptic coagulation necrosis that was selectively limited to the mucosa and submucosa. The inflammatory cell reaction in the noninfarcted tissue adjacent to the affected segment was negligible, although hyperemia and capillary dilatation were intense. By the fifth postoperative day, the necrotic mass was replaced by ingrowing granulation tissue. Thereafter, proliferation and consequent contraction of the granulation tissue ensued, leading to the obstruction of the intestinal lumen. Type 2 atresia, in which there was a long cord segment between the blind ends of the intestine, was seen 11 days after devascularization. Because the microscopic findings of the atretic segment were similar to those described in humans, the course of intestinal atresias in humans may be similar and may be caused by vascular occlusive phenomena.

3978 SPHERICAL AGGREGATES OF COXSACKIE B_4 VIRUS PARTICLES IN MOUSE PANCREAS. (Eng.)

Harb, J. M.; Burch, G. E. (Tulane Univ. Dept. Medicine, 1430 Tulane Ave., New Orleans, LA 70112). *Beitr. Pathol.* 156(2):122-127; 1975.

A high titer culture of Coxsackie B_4 virus was used to induce pancreatitis in newborn HaM/ICR mice. One or two days after the i.p. inoculation of 0.1 ml of virus culture fluid ($10^{-8.5}$ $TCID_{50}$), cytonecrosis consistent with picornaviral infection, as well as necrosis indicative of pancreatitis, was observed. Aggregates of particles resembling Coxsackie B_4 virus particles, some arranged in the typical picornaviral crystalloid lattice formation and others arranged into spherical masses approximately 102 nm in diameter, were also seen. Depending upon the depth and orientation of section through the spherical aggregates, the particles were arranged into two readily distinguishable patterns. When the plane of section was through the center of the sphere, 10 particles, circularly arranged around a dense particle core, were observed; when the sphere was cut tangentially, the particles were arranged in a zig-zag pattern so that there were two concentric layers of at least 6 particles per layer and no central core. Both crystalloid and spherical aggregates were observed to be free within acinocyte cytoplasm, and within autophagic vacuoles, cytosegresomes, and fine granular bodies of acinocytes, and within phagocytic vacuoles of macrophages. It is concluded that the spherical aggregates represent a distinct crystalloid form of Coxsackie B_4 virus during its replicative cycle, which may eventually develop into the more typical picornaviral crystalloid lattice configuration and that the spherical aggregates are located in foci of viral synthesis.

3979 EFFECT OF CIMETIDINE ON GASTRIC POTENTIAL DIFFERENCE IN MAN. (Eng.)

Ivey, K. J.; Baskin, W.; Jeffrey, G. (Sch. Medicine, Univ. Missouri, Columbia, MO 65201). *Lancet* 2(7944):1072-1073; 1975.

In order to evaluate cimetidine-induced changes on the mucosal barrier, its effect on the gastric potential difference (PD) was studied in five healthy subjects. The PD was recorded continuously, and basal PD (mean ± standard error) was -48 ± 1.0 mV. Cimetidine (300 mg, p.o.) increased the PD to -64 ± 2.4 mV ($p<0.001$). Cimetidine also significantly decreased basal acidity from pH 2 to pH 7 within 1 hr. The effect on both the PD and pH persisted throughout each 3-hr study. The PD is known to correlate with changes in the human gastric mucosal barrier. Cimetidine may have a protective effect on the gastric mucosal barrier in addition to its suppression of acid secretion, and may, therefore, be of value in treating patients with gastric ulcer who may have an abnormal gastric mucosal barrier.

3980 HYPERTROPHY AND HYPERPLASIA OF THE NEONATAL RAT EXOCRINE PANCREAS INDUCED BY ORALLY ADMINISTERED SOYBEAN TRYPSIN INHIBITOR. (Eng.)

Melmed, R. N.; El-Aaser, A. A. A.; Holt, S. J. (Hadassah-Univ. Hosp., P.O. Box 499, Jerusalem, Israel). *Biochim. Biophys. Acta* 421(2):280-288; 1976.

RNA, DNA, protein, and phospholipid synthesis were measured in the neonatal Wistar rat pancreas following the daily p.o. administration of partially purified soybean trypsin inhibitor (2 mg/g). Studies involving the i.p. injection of ^{3}H-thymidine, ^{13}C-orotic acid, ^{3}H-leucine, or ^{14}C-glycerol showed an enhanced synthesis of DNA, RNA, protein, and phospholipid, resp. Evidence of true hyperplasia, in addition to this cellular hypertrophy, was provided by an increased mitotic activity in the exocrine pancreas following a wave of enhanced ^{3}H-thymidine incorporation into DNA. Complete inhibition of the stimulated RNA synthesis by low doses of actinomycin D (80 μg/kg, i.p.) indicated the importance of transcription as a regulatory step in the response of the exocrine pancreas to trophic stimulation by this means. Collateral observations of ^{3}H-thymidine and ^{14}C-orotic acid incorporation into liver DNA and RNA, resp., failed to demonstrate comparable changes, confirming the probable specificity of the trypsin inhibitor-induced effect on the exocrine pancreas. It is suggested that the pronounced trophic effect of p.o. administered soybean trypsin inhibitor in the neonatal rat pancreas may serve as a useful model for the study of regulatory mechanisms of nucleic acid and protein synthesis in the mammalian pancreas.

3981 SECRETIN CELLS IN THE GASTROINTESTINAL TRACT. (Eng.)

Chey, W. Y.; Escoffery, R. (224 Alexander St., Rochester, NY 14607). *Endocrinology* 98(6):1390-1395; 1976.

The morphology and distribution of secretin (S) cells in the gastrointestinal tract were investigated by the indirect immunofluorescence antibody technique, using a highly specific rabbit anti-secretin sera in nine human subjects and in five mongrel dogs. The fluorescence reaction was not blocked by an excess amount of gastrin, cholecystokinin, glucagon, vasoactive intestinal polypeptide, or motilin, whereas secretin blocked the reaction. The S cells were seen in the mucosa of the antrum and duodenum in both humans and dogs and throughout the entire length of the canine small intestine. They were not found in the mucosa of the esophagus, fundus of the stomach, or rectum. These cells were either pyramidal in shape or pear shaped and were one third of the size of gastrin cells. A small number of S cells were seen in the body of the stomach in two human subjects, but they were absent in the mucosa of the esophagus and the rectum. The results indicate that S cells are distributed throughout the entire length of the small intestine including the duodenal bulb, although they were seen more frequently in the duodenum, as observed in other studies.

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3982 PHARMACOLOGIC STUDIES OF HIRSCHSPRUNG'S DISEASE ON A MURINE MODEL. (Eng.) Richardson, J. (McGill Univ., 3655 Drummond St., Montreal, P.Q., Canada H3G 1Y6). *J. Pediatr. Surg.* 10(6):875-884; 1975.

The pharmacology of a murine model of aganglionosis was investigated in C57Bl-a$^+$ mice to demonstrate the presence or absence of the nonadrenergic inhibitory system in the aganglionic contracted portion of the terminal bowel. The contracted portion of the terminal colon and rectum of 44 affected mice was removed and mounted longitudinally in a 10 ml bath to which rectangular pulses of 50-70 V (0.5 msec duration) and 2-20 Hz were delivered. Drugs were added to the bath. The diseased bowel showed slow (2/min) regular contractions of high amplitude, while the normal bowel showed rapid (10-12/min) regular contractions of low amplitude. Epinephrine (10^{-6}-10^{-7} g/ml), norepinephrine, and isoproterenol abolished the large contractions of the abnormal bowel and relaxed it. Acetylcholine (10^{-8}, 10^{-7}, 2 x 10^{-7} g/ml) contracted both the normal and abnormal bowels. Atropine (10^{-7} g/ml) decreased the amplitude of the contractions of the abnormal bowel, but did not completely abolish them. Field stimulation produced a relaxation and rebound contraction in the normal bowel, but not in the diseased bowel. Bretylium tosylate (10^{-5} g/ml), propranolol (10^{-6} g/ml), hexamethonium, phenoxybenzamine hydrochloride (10^{-6} g/ml), and indomethacin (20, 100 μg/ml) had no effect on the relaxation of the normal tissue in response to field stimulation, in the presence of adrenergic and cholinergic blockage. Tetrodotoxin (2 x 10^{-7} g/ml) abolished the relaxation on the subsequent contraction produced by field stimulation. Dopamine had no obvious effect on either the normal or the abnormal tissues. ATP (10^{-5} M) did not produce a relaxation of either the normal or the abnormal bowels. The results indicate an absence of, or a defect in, the nonadrenergic inhibitory nervous system in the spastic bowel of the diseased mice and confirm previous findings in human tissue.

3983 CONJUGATIVE BIOTRANSFORMATION OF XENOBIOTICS IN THE GUNN RAT [Abstract]. (Eng.) Marniemi, J.; Vainio, H.; Parkki, M. G. (Dept. Physiology, Univ. Turku, 20520 Turku 52, Finland). *Acta Physiol. Scand.* 95(2):61A-62A; 1975.

3984 EXAMINATION OF THE MICROCIRCULATION IN ACUTE INTESTINAL OBSTRUCTION. (Rus.) Kulieva, Kh. D.; Gel'frat, E. B.; Abnaev, S. A. (N. Narimanov Azerbaijan Medican Inst., Azerbaijan, USSR). *Klin. Khir.* (8):10-13; 1975.

3985 THE CHANGES IN RNA SYNTHESIS AT EARLY STAGES OF AMINOAZO CARCINOGENESIS. (Rus.) Mironov, N. M.; Adler, V. V.; Sokolov, N. A.; Zaboikin, M. M.; Shapot, V. S. (Inst. Experimental and Clinical Oncology, USSR Acad. Medical Sciences, Moscow, USSR) *Biokhimiia* 40(4):861-868; 1975.

3986 CHARACTERISTICS OF PATHOMORPHOLOGICAL MANIFESTATIONS OF SALMONELLOSIS INFECTION IN GUINEA PIGS AND HAMSTERS. (Rus.) Lobanova, Z. I.; Orlovskii, V. I.; Bochkov, I. A. (Scientific Res. Lab. of Experimental Biological Models, USSR Acad. Medical Sciences, Moscow, USSR). *Arkh. Patol.* 37(8):20-25; 1975.

3987 PREPARATION OF STABLE, NON-DISLOCATING INTESTINAL INVAGINATION VALVES. STUDY IN ANIMAL EXPERIMENTS. (Ger.) Geroulanos, S.; Schauwecker, H. H.; Hahnloser, P.; Saeuberli, H.; Kock, N. G. (Chirurgische Klinik A, Kantonsspital, CH-8006 Zurich, Switzerland). *Helv. Chir. Acta* 42(1/2):107-110; 1975.

3988 THE EFFECTS OF BITRUNCAL VAGOTOMY ON THE ACTIVITY OF THE SPHINCTER OF ODDI. AN INVESTIGATION IN DOGS. (Fre.) Levasseur, J.-C.; Germain, M.; Martin, E. (Centre de Chirurgie experimentale, Hopital de Vaugirard, 389, rue de Vaugirard, 75015 Paris, France). *Ann. Chir.* 29(2):151-154; 1975.

3989 BYPASS TECHNIQUES DURING THE ANHEPATIC STAGE OF TRANSPLANTATION OF THE LIVER. (Fre.) Azpeitia, D.; de Miguel, E.; Juffe, A.; Romero, E.; Castillo-Olivares, J. L. (Service de Chirurgie experimentale, Clinique "Puerta de Hierro," Universite autonome de Madrid, Madrid, Spain). *Ann. Chir.* 29(2):155-160; 1975.

3990 CHANGES IN FUNCTIONAL STATE OF THE RAT LIVER AND KIDNEY MITOCHONDRIA UNDER THE EFFECT OF ELECTROMAGNETIC FIELDS. (Ukr.) Faitel'berg-Blank, V. R.; Shapovalova, L. A. (Dept. Pathophysiology and Biophysics, Odessa Agricultural Inst., Odessa, USSR). *Ukr. Biokhim. Zh.* 47(4):491-494; 1975.

3991 SWELLING AND CONCENTRATION OF RAT LIVER MITOCHONDRIA UNDER EFFECT OF HEXACHLOROCYCLOHEXANE γ-ISOMER AND POLYCHLOROCAMPHENE ON ANIMALS. (Ukr.) Khaikina, B. I.; Kuz-mins'ka, U. A.; Veremenko, L. M. (All-Union Scientific Res. Inst. of Hygiene and Toxicology of Pesticides, Polymers and Plastic Materials, Kiev, USSR). *Ukr. Biokhim. Zh.* 47(4):487-490; 1975.

3992 CONTINENT COLOSTOMY IN DOGS. (Ger.) Saeuberli, H.; Geroulanos, S.; Hahnloser, P.; Schauwecker, H. H.; Kock, N. G. (Chirurgische Universitatsklinik A, Kantonsspital, Ramistrasse 100, CH-8006 Zurich, Switzerland). *Helv. Chir. Acta* 42(1/2):111-114; 1975.

3993 MACROSCOPIC AND HISTOCHEMICAL INVESTIGATIONS OF ACETIC ACID-INDUCED EXPERIMENTAL ULCER OF THE RAT STOMACH. (Ger.) Militzer, K.; Hell, I. (Universitatsklinikum, D-4300 Essen 1, Hufelandstr. 55, W. Germany). *Z. Gastroenterol.* 13(7):629-638; 1975.

3994 FISTULA OF THE ISOLATED TOTAL GASTRIC POUCH IN THE RAT. (Fre.) Van Hung Le (Equipe de Recherche, C.N.R.S. n° 145, Universite Pierre-et-Marie-Curie, 8, quai Saint-Bernard, 75005 Paris, France). *C. R. Acad. Sci.* [D] (Paris) 282(22):1963-1965; 1976.

3995 ELECTRON MICROSCOPE STUDY OF ACID POLYSACCHARIDES ON THICK SECTIONS OF INTESTINE AND KIDNEY TISSUE. (Fre.) Thiery, G. (Departement de Protection, CEN de Fontenay-aux-Roses, France). *Bull. Inf. Sci. Tech. Commis. Energ. At. (Fr.)* (207):33-43; 1975.

See also, 3867, 4457, 4554.

DIAGNOSTIC PROCEDURES

3996 DIAGNOSIS OF HIRSCHSPRUNG'S DISEASE BY QUANTITATIVE BIOCHEMICAL ASSAY OF ACETYLCHOLINESTERASE IN RECTAL TISSUE. (Eng.) Boston, V. E.; Dale, G.; Riley, K. W. A. (Fleming Memorial Hosp. Sick Children, Great North Road, Newcastle-upon-Tyne, NE2 3AX, U.K.). *Lancet* 2(7942):951-953; 1975.

Acetylcholinesterase activity was measured in rectal biopsy specimens from 19 children in whom a provisional diagnosis of Hirschsprung's disease had been made. The biochemical assay was based on the procedure in which thiocholine, produced by enzymic hydrolysis of acetylthiocholine iodide, reacts with a color reagent to produce an anion with a peak absorbance at 412 nm. Seven children, in whom histological examination of biopsy material confirmed the diagnosis, had a mean acetylcholinesterase activity of 10.5 U/g tissue (standard deviation=6.9), while the remaining 12 children, in whom the diagnosis was excluded, had a mean activity of 34.34 U/g (s.d.=18.08). The difference between the two groups was statistically significant ($p<0.001$). The results indicate that the measurement of acetylcholinesterase activity may be valuable in the diagnosis of Hirschsprung's disease.

3997 ELECTROPHORETIC AMYLASE FRACTIONATION AS AN AID IN DIAGNOSIS OF PANCREATIC DISEASE. (Eng.) Legaz, M. E.; Kenny, M. A. (Univ. Washington Sch. Medicine, Seattle, WA 98195). *Clin. Chem.* 22(1):57-62; 1976.

Six α-amylase isoenzymes were resolved by electrophoresis on cellulose acetate membranes in a discontinuous buffer system. The fastest migrating isoenzymes were of salivary origin (S1, S2, and S3); the slower ones were of pancreatic origin (P1, P2, and P3). The amylase isoenzyme distribution was determined in the sera of 240 subjects. A specific pancreatic isoenzyme (P3) was observed in all clinically diagnosed cases of acute or chronic pancreatitis and in 15 of 40 renal-transplant patients. P3 isoenzyme activity declined during apparent recovery from pancreatitis. The P2 isoenzyme appeared in 95% of all specimens, P1 in only 2%. The pancreatic isoenzymes were preferentially excreted in the urine of both renal transplant patients and normal individuals. The major salivary isoenzyme, S1, was observed in 95% of all serum and urine samples; S2 and S3 appeared less consistently. The method is simple and rapid, and is applicable for use in the clinical evaluation of patients with pancreatitis or with nonpancreatic dysfunction.

3998 INCIDENCE AND CLINICAL SIGNIFICANCE OF e ANTIGEN AND ANTIBODY IN ACUTE AND CHRONIC LIVER DISEASE. (Eng.) Eleftheriou, N.; Heathcote, J.; Thomas, H. C.; Sherlock, S. (Royal Free Hosp., London NW3, England). *Lancet* 2(7946):1171-1173; 1975.

The sera of a variety of patients with liver disease, including asymptomatic hepatitis B surface antigen (HBsAg) carriers, were tested for the presence of e antigen and its antibody (anti-e) by a standard immunodiffusion technique, and the clinical value of the e/anti-e system was evaluated. The antigen was not detected in the serum of any of 99 cases of acute type B hepatitis who recovered normally. Anti-e was found in 14 cases. The antibody usually appeared before the clearance of HBsAg and before th appearance of antibody to HBsAg (HBsAb). Serum e wa not detected in any of 29 asymptomatic carriers of HBsAg, but 21 showed anti-e. Serum e was found in the sera of 35 of 79 patients with chronic active hepatitis and in the sera of 5 of 16 patients with chronic persistent hepatitis. The antibody was detected in only 2 of 79 patients with chronic activ hepatitis but in 7 of the 16 patients with chronic persistent hepatitis. Serum e was not found in five patients with primary liver cell carcinoma or in five with inactive HBsAg-positive cirrhosis. The antibody was found in all five of those with inactiv cirrhosis and in four of the five with primary cance These results suggest that the presence of e antigen is associated with active, and usually continuing, liver disease. Anti-e, however, is associated with inactive liver disease and asymptomatic carriage of HBsAg, and its presence is a valuable sign in predicting those who will escape progressive chronic liver disease.

3999 SERUM LYSOZYME IN INFLAMMATORY BOWEL DISEASE. (Eng.) Dronfield, M. W.; Langman, M. J. S. (City Hosp., Nottingham, U.K.). *Gut* 16(12):985-987; 1975.

The mean serum concentration of lysozyme was determined by spectrophotometry and by a lysoplate method and compared in 27 patients with Crohn's disease, 25 patients with ulcerative colitis, and 26 healthy volunteers. The mean concentration was significantl higher in patients with Crohn's disease and ulcerative colitis than in the controls ($p<0.001$ and $p<0.02$, resp.). Higher levels than those found in any of the controls were obtained in 11 patients with Crohn's disease and in 6 with ulcerative colitis. The mean lysozyme concentration in Crohn's disease was not significantly higher than that in ulcerative colitis. It seems likely that the raised enzyme levels detectable in some patients wer due to lysozyme derived from tissue macrophages and epithelioid cells, as no correlation was detectable between serum lysozyme and blood monocyte or neutrophil counts. These findings differ from those obtained by previous authors, who suggested that serum lysozyme levels would be useful in distinguishing Crohn's disease from ulcerative colitis.

4000 BARIUM-ENEMA STUDY FINDINGS IN ASYMPTOMATI PATIENTS WITH RECTAL POLYPS. (Eng.) Cor-man, M. L.; Veidenheimer, M. C.; Coller, J. A. (Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215). *Lahey Clin. Found. Bull.* 24(4) 133-159; 1975.

The value of barium enema on patients found to have asymptomatic rectal polyps was investigated in 200 consecutive patients. In all, 311 polyps were found: 153 patients had a single rectal polyp (76.5%), 26 patients had two polyps (13.0%), five had three polyps (2.5%), and 16 patients had four or more polyps. The polyps were evenly distribute

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around the circumference of the bowel. The sizes of the polyps found on proctosigmoidoscopy were estimated, the largest was 35 mm in diameter and the mean size was 5.5 mm. Sessile polyps were found in 176 patients (88%) and pedunculated polyps in 24 patients (12%). In 177 patients (88.5%), barium enema studies disclosed no abnormality except insignificant diverticular disease. Questionable filling defects in 18 patients (9%) necessitated repeat air-contrast barium enema studies. In each of these cases, the repeat study failed to confirm the presence of the polyp. In four patients (2%, case reports included), barium enema studies disclosed unquestionable polypoid lesions. In one patient a carcinoma of the sigmoid colon was demonstrated and confirmed on repeat examination. The 200 patients had a total of 219 barium enema studies, but the overall incidence of significant pathologic findings was 2.5%. Routine use of barium enema studies for patients with sessile polyps cannot be supported in terms of cost on the basis of this report.

4001 IMPORTANCE OF THE SITE OF ENDOSCOPIC GASTRIC BIOPSY IN ULCERATING LESIONS OF THE STOMACH. (Eng.) Hatfield, A. R. W.; Slavin, .; Segal, A. W.; Levi, A. J. (Northwick Park Hosp., Watford Rd., Harrow, Middlesex HA1 3UJ, U.K.). *Gut* 16(11):884-886; 1975.

To determine the best site for gastric biopsy, 20 freshly resected stomach specimens, each containing an ulcerated carcinoma, were studied. Using endoscopic biopsy forceps, multiple biopsies were obtained from various sites around the ulcer. Carcinoma was detected with similar frequency in biopsies from the slough (75%) and from the rim (80%) of the ulcer. The positive biopsy rate was increased to 95% when the results from the rim and the slough were combined. The authors suggest that the diagnostic accuracy of endoscopic gastric biopsy can be improved by taking biopsies from both the rim and the slough of an ulcer.

4002 COLONOSCOPY ASSOCIATED BACTEREMIA. (Eng.) Dickman, M. D.; Farrell, R.; Higgs, R. H.; Wright, L. E.; Humphries, T. J.; Wojcik, J. D.; Chappelka, R. (Naval Regional Medical Center, Philadelphia, PA). *Surg. Gynecol. Obstet.* 142(2):173-176; 1976.

The incidence of bacteremia was investigated before and after diagnostic and/or therapeutic colonoscopy in 52 patients. Of the 27 patients who underwent diagnostic colonoscopy, 2 were found to have procedure-associated isolates. Both patients had colonic carcinoma involving the liver. *Escherichia coli* and bacteriodes species were found in blood samples taken at 5 min after the procedure in the first patient and at the time the colonoscope was in the transverse colon of the second patient. Bacteroides bacteremia was also found in a third patient in whom inadvertent perforation of the colon occurred. Bacteremia was not found in any of 13 patients who underwent both colonoscopy and biopsy or in 12 patients who underwent both colonoscopy and snare polypectomy. Of the four patients with disorders potentially impairing host defences, only the two mentioned above developed bacteremia. These data suggest that routine prophylactic antibiotic coverage is unnecessary in uncompromised patients.

4003 ENDOSCOPIC RETROGRADE CHOLANGIO-PANCREATOGRAPHY (ERCP) IN PATIENTS WITH BILLROTH II PARTIAL GASTRECTOMIES. (Eng.) Osnes, M.; Myren, J. (Ulleval Hosp., Oslo 1, Norway). *Endoscopy* 7(4):227-232; 1975.

A new technique to facilitate entering the afferent loop with the duodenoscope in endoscopic retrograde cholangiopancreatography (ERCP) was used on 20 patients who had had Billroth II partial gastrectomies. A graded stiffening of the duodenoscope (Olympus JF B 2) was performed by hand after introduction of the tube into the channel of the duodenoscope. The tube was not removed until the duodenoscope had entered the descending part of the duodenum and was localized for the cannulation of the papilla of Vater for ERCP or for the inspection of the sutured duodenal stump. Entering of the afferent loop with visualization of the papilla of Vater was successful in 17 patients, and cannulation of the papilla was achieved in 16 cases. A retrograde cholangiography was obtained in 14 patients. Retrograde pancreatography was obtained in 13 cases. No complications occurred. This method apparently results in a higher rate of successful ERCP procedures than reported by previous authors.

4004 PSEUDOCALCULUS OF THE COMMON BILE DUCT: A DYNAMIC RADIOGRAPHIC DIFFERENTIATION FROM TRUE RETAINED STONE. (Eng.) Wertheimer, M.; Brooke, W. S.; Koehler, P. R.; Nelson, J. A. (Univ. Utah Medical Center, Salt Lake City, UT). *Am. J. Surg.* 130(6):742-745; 1975.

The radiographic differentiation of pseudocalculus of the common bile duct from a true retained stone is discussed. In the past 4 yr, five patients with static T-tube cholangiographic evidence of retained distal common duct calculi have been seen. A preoperative cholangiogram demonstrated these to be pseudocalculi, or artifacts of common bile duct physiology and anatomy. The unique anatomy and physiology of the distal common duct are responsible for the production of the pseudocalculus sign. During maximal sphincter contraction, contrast material in the common bile duct may demonstrate a convexity or a meniscus identical to that which might be produced by a true calculus. This is the pseudocalculus sign, and static cholangiograms illustrating this sign are presented. The risk of mortality and morbidity with reexploration of the common duct emphasizes the need for differentiating a pseudocalculus from a true retained stone.

4005 PERCUTANEOUS ANTECUBITAL TRANSVENOUS CHOLANGIOGRAPHY: A MODIFIED TECHNIQUE USING A FLEXIBLE NEEDLE. (Eng.) Hawkins, I. F., Jr.; NcNeely, G. F.; Weaver, D. L., Jr. (Univ. Florida Coll. Medicine, Gainesville, FL 32610). *Radiology* 120(2):423-425; 1976.

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A modified technique of percutaneous antecubital transvenous cholangiography that facilitates the procedure in patients with fibrotic livers is described. A number 9 French catheter is positioned in the right hepatic vein with a flexible 20-gauge needle extending into the liver parenchyma. The number 9 French catheter is inserted over a number 5 French teflon catheter-guide wire combination. The needle is sheathed in a number 5 French catheter inside a number 9 French catheter, and its tip is positioned just proximally to the end of the sheath. The number 5 French sheath and number 9 French catheter are stabilized, and the hub of the needle is advanced under fluoroscopic control. The position of the tip can be verified externally by a mark at the hub end of the needle. In children, a 20- or 21-gauge cannula with a pencil-point stylus is employed instead of a number 5 French Teflon sheath, and a number 5 French Teflon catheter is used in place of the number 9 French catheter. The percutaneous antecubital transvenous cholangiography was used in eight patients, and was successful in the six patients with obstructive jaundice; the failures occurred in two patients with no bile duct dilatation. There were no complications, and no bile leakage or bleeding was seen at laparotomy. This technique appears to be the method of choice, as it is fast (less than 30 min in each of the 8 patients), requires very little skill to catheterize the hepatic veins, and because multiple passes into the parenchyma can be easily accomplished.

4006 A SIMPLE TEST TO DETERMINE THE SITE OF BLEEDING IN THE UPPER PART OF THE GASTROINTESTINAL TRACT. (Eng.) Rosenberg, S. A.; Harken, A. H. (Peter Bent Brigham Hosp., Boston, MA). *Surg. Gynecol. Obstet.* 142(2):241-242; 1976.

A noninvasive test for distinguishing variceal bleeding from bleeding due to gastritis or ulcer disease was tested in 14 patients with upper gastrointestinal bleeding. The test was based upon certain principles: blood from esophageal varices contains highly unsaturated hemoglobin; arterial blood from gastritis and ulcer disease is well oxygenated; and small amounts of unsaturated venous blood are capable of binding the small volume of oxygen dissolved in saline solution irrigant, significantly lowering the oxygen tension of the mixture. Thus, 100 ml of saline were instilled into the stomach of the bleeding patient, and arterial and venous blood samples were obtained. Blood tinged gastric saline solution were then obtained in 5-ml samples, and oxygen tension and hemoglobin concentration were measured. The test correctly predicted the site of bleeding in four of five patients with variceal hemorrhage and in all nine patients with bleeding from gastritis or ulcers. Preliminary results suggest further use and evaluation of the test.

4007 MASSIVE EXTRA-ENTERIC GASTROINTESTINAL BLEEDING: ANGIOGRAPHIC DIAGNOSIS. (Eng.) Koehler, P. R.; Nelson, J. A.; Berenson, M. M. (Univ. Utah Medical Center, 50 N. Medical Drive, Salt Lake City, UT 84132). *Radiology* 119(1):41-44; 1976.

Two patients with life-threatening gastrointestinal bleeding arising from aneurysms in visceral vessels outside the alimentary tract are described. The first patient, a 51-yr-old woman with a history of chronic calcific pancreatitis and mild hypertension, had intermittent episodes of right upper quadrant and epigastric pain associated with hematemesis and melena, slight scleral icterus, and mild hepatomegaly. Celiac angiography revealed a small aneurysm in the branch of the left hepatic artery. At laparotomy, the common duct was found to be greatly dilated. Operative cholangiography revealed multiple radiolucent filling defects in the biliary tract; the bile ducts were opened, multiple blood clots were extracted, the common hepatic artery was ligated, and the patient has remained asymptomatic for 3 yr since surgery. The second patient, a 60-yr-old woman, experienced anemia, malaise, melena, acute rectal bleeding, and hematemesis. Celiac and superior mesenteric angiography were initially interpreted as normal, except for a small aneurysm at the distal end of the splenic artery. The presumptive diagnosis of bleeding cecal diverticulum was made; subtotal colectomy was performed and the patient remained asymptomatic for 3 months. When gastrointestinal bleeding recurred, a visceral angiogram demonstrated that the splenic artery aneurysm ha increased in size. Re-injection of the celiac arter demonstrated that the aneurysm had continued to increase in size, and during one injection, extravasation of contrast medium into the main pancreatic duct was observed. On histological examination of the sections taken through the pancreas, a markedly dilated pancreatic duct was found with portions of the duct occluded by fresh thrombus. Verhoeff van Gieson stain revealed a region of aneurysmal dilatation of the branch of the splenic artery with direc communication between it and the lumen of the pancreatic duct. Endoscopy and/or barium contrast studies were of little value in the diagnosis of the aneurysms in these patients, and the conclusive diagnosis was made by angiography. It is concluded that splenic artery aneurysms should usually be resected and splenectomy should be performed; hepati artery aneurysms are probably best treated by segmental hepatic resection, but hepatic artery ligations, proximal to the gastroduodenal artery, may also prove successful.

4008 GALLIUM CITRATE Ga 67 ACCUMULATION IN PSEUDOMEMBRANOUS COLITIS. (Eng.) Tedesco F. J.; Coleman, E.; Siegel, B. A. (Univ. Miami Sch. Medicine, PO Box 520875, Biscayne Annex, Miami, FL 33152). *JAMA* 235(1):59-60; 1976.

The case of a 71-yr-old man with a colonic accumulation of ^{67}Ga in conjunction with pseudomembranous colitis is presented. The patient underwent laparotomy, which revealed obstruction of the distal ileum by adhesive bands and perforation of a jejunal diverticulum with an omental abscess; 60 cm of the small bowel was resected, and the adhesive bands wer lysed. On the 17th postoperative day, a ^{67}Ga-scan was performed to evaluate a possible intra-abdominal abscess; the images at both 48 and 68 hr showed diffuse activity within the entire colon. On the 24th postoperative day, proctoscopy showed 5-mm plaqueike lesions covering the rectal mucosa; a rectal iopsy confirmed the diagnosis of pseudomembranous olitis. Blood and tissue samples were obtained at bout 97 hr after the injection of a radiopharmaeutical and were counted in a crystal-well scinillation counter. The tissue/serum activity ratio as 45.3 for the pseudomembrane, 57.5 for the adjaent colonic mucosa, and 0.2 for the luminal contents. n this patient, colonic accumulation of ^{67}Ga was not ue to luminal activity but to concentration in the nflamed mucosa and pseudomembranes. This was conirmed by counting the biopsy specimens. The findings ndicate that apparent colonic activity on ^{67}Gamages should not always be assumed to represent ecal activity. The possibility of colonic wall ocalization in inflamed bowel should be considered.

009 CHRONIC GASTRITIS--A SIMPLE CLASSIFICATION.

(Eng.) Rao, S. S.; Krasner, N.; Thomson, . J. (Stobhill General Hosp., Glasgow, G21 3UW, cotland). *J. Pathol.* 117(2):93-102; 1975.

simple classification of chronic gastritis, based n subjective assessment of the degree of chronic nflammatory infiltration and atrophy of mucosal lands, was employed with gastric biopsy specimens rom 241 patients with chronic peptic ulceration, astric carcinoma, or x-ray-negative dyspepsia. he biopsies were taken from the mucosa of the pyoric antrum and from the lower, middle, and upper hirds of the stomach. Chronic inflammatory cellular nfiltration confirmed the diagnosis of chronic astritis in 184 patients. Of 28 patients with a ild degree of chronic inflammatory cell infiltration mainly of plasma cells and lymphocytes), 5 showed trophy. Of 88 patients with moderately severe hronic inflammatory cell infiltration (lymphocytes, lasma cells, and a few eosinophils), atrophy was resent in 23. Of the 68 patients with severe hronic inflammatory cell infiltration (lymphocytes, lasma cells, eosinophils, and a few neutrophil olymorphs), 39 demonstrated loss of glands and trophy. True superficial gastritis was seen in nly three patients; the chronic inflammatory cell nfiltration was limited to the lamina propria etween gastric pits in these patients. The authors onclude that many cases of superficial gastritis re really mild, moderately severe, or severe cases f chronic gastritis without atrophy, and that their lassification can be applied to gastric mucosa, rrespective of the site from which it has been aken.

010 CARCINOMA OF THE DUODENUM: ITS PREOPERATIVE DIAGNOSIS.

(Eng.) Satake, K.; Sowa, M.; Yamashita, K.; Kamino, K.; Kinoshita, H.; Kato, M.; Umeyama, K. (Osaka City Univ. Medical Sch., Osaka, Japan). *Br. J. Surg.* 62(12):973-976; 1975.

Two new cases of duodenal carcinoma are presented. In the first patient, a 65-yr-old man who had undergone gastrectomy for gastric ulcer 1 yr previously, a 2 x 3-cm filling defect of the distal duodenum with slight dilatation proximally was found in the upper gastrointestinal (GI) series following a 1-month history of malaise, weight loss, dull back pain, and vomiting. A well-localized tumor with ulceration in the center was seen on duodenoscopic examination; biopsy revealed a well-differentiated adenocarcinoma. In the second patient, a 35-yr-old man with a 7-month history of crampy, epigastric pain, upper GI examination showed a 2-cm ulcerating growth in the third portion of the duodenum and a 3 x 4-cm filling defect around the ulceration; the results of duodenoscopy revealed a 6 x 7-cm tumor, and biopsy showed a poorly differentiated adenocarcinoma. The treatment in both patients consisted of an extended pancreatoduodenectomy. Reconstruction was accomplished by suturing the common bile duct to the proximal end of the jejunum, implanting the pancreatic duct by direct suture of pancreas and jejunum in an end-to-side fashion, and constructing a gastrojejunostomy. There was no extension of the carcinoma through the duodenum and no lymph node metastases in the first patient, and he has been asymptomatic for 14 months. Although the tumor was larger in the second patient, he has been free of symptoms for 3 months. These cases and others in the literature suggest that duodenoscopy and biopsy are valuable in the diagnosis of this disease, and that they increase resectability and the 5-yr survival rate.

4011 URINARY POLYAMINE LEVELS IN PATIENTS WITH GASTROINTESTINAL MALIGNANCY.

(Eng.) Lipton, A.; Sheehan, L.; Harvey, H. A. (Milton S. Hershey Medical Center, Pennsylvania State Univ., Hershey, PA 17033). *Cancer* 36(6):2351-2354; 1975.

A pilot study of urinary polyamine values was undertaken in 24 patients with localized and metastatic gastrointestinal tumors. Twenty-four-hr urine samples were obtained from 50 normal volunteers to establish a normal range for urinary polyamines. Polyamine values were obtained by high-voltage electrophoresis. The normal range for putrescine was 0.8 to 6.2 mg/24 hr; for spermidine, 0.9 to 3.9 mg/24 hr; and for spermine, 1.0 to 4.2 mg/24 hr. Eleven of 14 patients with widespread metastases had elevation of two or more of the polyamines. Putrescine was elevated (6.7-8.6 mg/24 hr) in three patients, two with primary adenocarcinoma arising in the sigmoid and one with primary adenocarcinoma arising in the rectum. Spermidine was elevated (3.9-15.9 mg/24 hr) in 11 patients and spermine was elevated (4.1-11.1 mg/24 hr) in 12 patients in whom the malignancies arose from an adenocarcinoma of the pancreas, rectum, sigmoid, colon, stomach, or rectosigmoid, or from an epidermal carcinoma of the anus. Two patients with localized colon cancer were compared with two patients with recurrence of the disease within the confines of the pelvis; all exhibited increased urinary excretion of two or three polyamines. In three patients who had a prior resection for gastrointestinal cancer and were clinically free of disease, the urinary polyamine values were within the normal range. Two patients with localized gastric lymphoma and one patient with villous adenoma also had normal urinary polyamine levels. These data suggest the following areas for further study: comparison of serum and urinary polyamine values to carcinoembryonic antigen in patients with Duke's

A, B, and C lesions; comparison of the value of serum and urinary polyamine values and carcinoembryonic antigen in evaluating the efficacy of surgery, radiation, or chemotherapy in patients with gastrointestinal malignancy; a comparison of the value of the high voltage electrophoresis method, amino acid analyzer, and radioimmunoassay of serum, urine, and colonic washings in different pathologic bowel conditions; and a study of polyamine values in bowel diseases that are known to lead to the development of malignancy in many patients.

4012 VALUE OF URINARY SIMPLE PHENOL AND INDICAN DETERMINATIONS IN THE DIAGNOSIS OF THE STAGNANT LOOP SYNDROME. (Eng.) Aarbakke, J.; Schjonsby, H. (Dept. Pharmacology, Univ. Bergen, MFH-Bygget, 5016 Haukeland Sykehus, Bergen, Norway). *Scand. J. Gastroenterol.* 11(4):409-414; 1976.

The urinary excretion of phenol, p-cresol, and indican was determined in 7 patients with the stagnant loop syndrome, 6 patients with celiac disease, 9 patients with chronic pancreatitis, 11 patients with Billroth II partial gastrectomy, and 18 control patients without gastrointestinal disease. The mean excretion of the compounds in the patients with the stagnant loop syndrome and in the control patients was 77 and 2.3 mg/24 hr of phenol ($p<0.05$), 164 and 39.5 mg/24 hr of p-cresol (not significant), and 369 and 41.5 mg/24 hr of indican ($p<0.01$), resp. When applied as diagnostic tests for the stagnant loop syndrome, the phenol excretion showed two false negative results; the p-cresol excretion showed three false negatives and two false positive results, and the indican excretion showed six false positive results. The combined use of phenol and indican determinations eliminated the number of false positive results with the indican test, and was found most useful as a screening procedure. Determination of phenol and indican in a 24-hr urine sample is likely to provide a simple method for selecting patients with signs of abnormal bacterial colonization in the small intestine for more detailed investigations.

4013 THE DIAGNOSIS OF GALLSTONES BY ULTRASONICS. (Ger.) Lutz, H.; Seidl, R.; Petzoldt, R.; Fuchs, H. F. (Medizinische Klinik mit Poliklinik der Universitat, 852 Erlangen, Krankenhausstr. 12, W. Germany). *Dtsch. Med. Wochenschr.* 100(24):1329-1331; 1975.

Ultrasonography, performed by a B-scan instrument in bidimensional technique, and radiological tests were compared in 267 patients suspected of having gallstones. Ultrasonic investigation was unevaluable in 9 patients due to adipositas or meteorism, while radiological pictures were unevaluable due to lack of opacification in 20 patients. The ultrasonic and radiologic findings were negative in 159 of the remaining 238 patients. Both methods gave positive findings concerning gallstones in 67 cases, which was confirmed surgically in 23 patients, by endoscopic retrograde scintigraphy in 4 patients, and by autopsy in 2 cases. The ultrasonic and radiologic findings were discordant in 12 cases. Surgery, performed in 7 of these 12 patients, confirmed the radiologic diagnoses in 4 cases and the ultrasonic findings in 3 cases. Solitary gallstones were visualized by ultrasonography as light-colored reflexes with an echo-free zone (shadow) behind them. Intense reflexes on the ventral surface of the stones and the corresponding shadows were seen when the gallbladder was filled with stones. Shadows without reflexes of the stones were seen in a few of these cases. The authors conclude that when cholelithiasis is suspected, ultrasonography is the choice diagnostic procedure because of its accuracy, simplicity, and the absence of any associated risk.

4014 OPERATIVE CHOLANGIOGRAPHY: A REAPPRAISAL BASED ON A REVIEW OF 400 CHOLANGIOGRAMS. (Eng.) Faris, I.; Thomson, J. P. S.; Grundy, D. J.; Le Quesne, L. P. (Dept. Surgical Studies, Middlesex Hosp. Medical Sch., London, England). *Br. J. Surg.* 62(12):966-972; 1975.

Experience with 400 cases of operative cholangiography is reviewed, and its usefulness in the diagnosis of stone in the common duct is compared with conventional clinical and operative indications. In 20.5% of the patients with stones in the common bile duct (CBD), there were neither clinical nor operative indications for choledochotomy, and the diagnosis was based solely on an abnormal cholangiogram. The rate of negative CBD explorations was 29%, compared to a rate of 28-44% reported elsewhere. False positives were most frequently due to air bubbles, which are avoidable. Contraction of the muscle surrounding the lower end of the duct, commonly caused by anesthetics, can give the appearance of a small stone. Inhalation of amyl nitrite can help clarify this situation. A normal operative cholangiogram saved 135 patients (36%) with indications for exploration from this unnecessary procedure. A significant increase in the diameter of the CBD occurs with age, which, if neglected, gives a misinterpretation of the cholangiogram in younger patients. The wider the duct, the greater is the chance of it harboring a stone. This study confirms that operative cholangiography is the best method for determining the presence of stones in the CBD.

4015 DOUBLE CONTRAST RADIOGRAPHY IN THE STUDY OF THE GASTRIC POSTERIOR WALL. (Fre.) Descombes, Ph.; Remond, A.; Capron, J. P.; Baillet, J.; Grumbach, Y.; Trinez, G. (C.H.U. place Victor-Pauchet, F 80000 Amiens, France). *J. Radiol. Electrol. Med. Nucl.* 57(1):1-6; 1976.

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See also, 3945, 4097, 4098, 4102, 4120, 4126, 4137, 4143, 4146, 4148, 4149, 4223, 4260, 4262, 4263, 4264, 4267, 4273, 4278, 4298, 4301, 4303, 4309, 4310, 4312, 4314, 4322, 4325, 4326, 4327, 4348, 4349, 4359, 4384, 4482, 4483, 4484, 4486, 4516, 4520, 4521, 4523, 4552, 4558.

GASTROINTESTINAL DISEASES

ESOPHAGUS

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4095 THE EFFECTS OF STIMULATING THE ESOPHAGOGASTRIC SPHINCTER WITH HYDROCHLORIC ACID.

(Rum.) Vlad, C. M. (Catedra de fiziologie, I.M.F., Bucharest, Rumania). *Fiziol. Norm. Patol.* 19(1):75-84; 1973.

The eventual effect of hydrochloric acid (HCl) stimulation on the behavior of the esophagogastric sphincter was investigated in 14 control subjects with normal sphincters and in five subjects with sphincteral hypotonia confirmed by manometrical measurements. The results were evaluated by pressure-tracing recorded with a Barovar-Barostyl Alvar electromanometer. The introduction of 5 ml distilled water at room temperature through a catheter placed at the level of the esophagogastric junction for a duration of 5 min induced a sudden pressure increase of 3-4 min duration in the 14 control subjects; subsequent introduction of HCl (5 ml at pH 1.6, equivalent to 25 mEq/l) through the same catheter and for the same duration determined an almost identical pressor effect. Both pressor effects were absent in the five patients with an insufficient sphincter. The author concludes that a normal, competent sphincter is not affected by the presence of small quantities of HCl introduced by experimental methods or by occasional gastric reflux.

4096 LONG-TERM CLINICAL, RADIOLOGICAL AND MANOMETRIC FOLLOW-UP OF PATIENTS WITH ACHALASIA OF THE ESOPHAGUS TREATED WITH ESOPHAGOMYOTOMY.

(Eng.) Csendes, A.; Larrain, A.; Strauszer, R.; Ayala, M. (Centro de Gastroenterologia, Hospital J. J. Aguirre, Santiago, Chile). *Digestion* 13(1/2):27-32; 1975.

The effects of esophagomyotomy on the clinical symptoms, resting gastroesophageal sphincter pressure (GESP), and the maximal internal diameter of the esophagus were studied in 20 patients who underwent surgery for esophageal achalasia. The surgical approach was transabdominal, and an anterior esophagomyotomy with a fundic patch was performed in all cases. One case was lost to follow up, and the rest were observed for a mean of 34 months (12-72 months). All but one patient became asymptomatic after surgery; dysphagia persisted in this patient because of a small stenosis at the esophagogastric junction, which was corrected by dilation. Before surgery, the mean diameter of the lumen of the gastroesophageal junction was 2.95 mm during barium flux; the diameter was significantly increased to 9.31 mm 1 month after surgery and was maintained throughout the observation period. The mean maximal internal diameter of the middle third of the thoracic esophagus was 5.15 cm; this was reduced to 3.28 cm after treatment. The mean resting GESP was 28.8 mm Hg before surgery, and was significantly decreased to 6.30 mm Hg following surgery. Late examination in 17 asymptomatic patients showed a mean GESP of 6.23 mm Hg. These preliminary results favor the use of esophagomyotomy in treating esophageal achalasia.

4097 TRANSIENT POST-VAGOTOMY DYSPHAGIA: A DISTINCT CLINICAL AND ROENTGENOGRAPHIC ENTITY.

(Eng.) Rogers, L. F. (McGaw Medical Center of Northwestern Univ., 303 E. Chicago Ave., Chicago, IL 60611). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(4):956-960; 1975.

Clinical and roentgenographic features of five cases of transient postvagotomy dysphagia are described. All patients underwent a transabdominal vagotomy for ulcer disease. In two patients, a Bilroth I partial gastrectomy was performed, and three patients underwent a pyloroplasty. Two patients also underwent simultaneous cholecystectomy. The time of onset of dysphagia varied from the 7th to the 15th postoperative day. In each case it was painless and associated with the initial ingestion of solid foods. Treatment in both cases consisted of temporary dietary exclusion of solid foods and of single passage of a number 18 Levin tube in one case and a single bougienage of a number 48 French bougie in another. The symptoms were completely relieved in all patients in 10-30 days. The typical roentgenographic finding was a smooth, tapered, persistent, narrowing of the distal 3-4 cm of the esophagus. The transverse diameter of the narrowed segment of the lumen measured 2-4 mm. The offending bolus of solid food was identified within the barium column at the site of tapering. The results show tha dysphagia is a transient postvagotomy disorder that requires no treatment other than the temporary exclusion of solid foods and the passage of a narrow tube.

4098 SCANNING WITH ^{99m}Tc IN THE DIAGNOSIS OF BARRETT'S ESOPHAGUS.

(Spa.) Culebras Fernandez, J. M.; Manrique Legaz, A. J.; Moreno Gonzalez-Bueno, C.; Ortiz Berrocal, J. (Servicio Cirugia Aparato Digestivo, Fundacion Jimenez Diaz, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 45(6):669-680; 1975.

The presence of columnar epithelial lining in the esophagus (Barrett's esophagus) was demonstrated by ^{99m}Tc scintiscan in a 9-yr-old boy with radiologically and endoscopically confirmed esophagostenosis of about 6-months duration. The study was carried out in a "Nuclear Chicago Pho Gamma III, H.P." gamma chamber, equipped with a high sensitivity collimator suitable for 140 kilo electron volts. The ^{99m}Tc was administered as pertechnetate (5 mCi, i.v.), and the scintiscans were recorded at a density of 300,000 counts per image. The scintiscans registered 10 and 15 min after the injection showed clear outlines of the stomach and lower third of the esophagus. After 20 min, an uptake zone was seen in the upper part of the esophagus at the level of the thyroid gland; the activity profile of a sagittal section through this zone showed three peaks of activity corresponding to the gastric antrum, lower esophagus, and thyroid gland. The scintiscans confirmed previous contrast radiology findings, which showed concentric stenosis in the lower third of the esophagus and hiatal hernia with abundant gastroesophageal reflux. Following esophagocologastrostomy, the histopathologic examination of the surgical specimen revealed fibrosis at the esophagogastric junction, with disappearance of the normal structures. The authors state that ^{99m}Tc uptake concentrated in the esophageal region is an unequivocal sign of gastric-type columnar epithelial lining, which, in turn, indicates the benignancy of the process. In view of the many similarities between peptic stenosis and carcinoma, this method is an effective tool in differential diagnosis. Its disadvantages were seen only in rare cases of neoplasms that developed over a peptic stenosis with conservation of some columnar epithelium, in which case ^{99m}Tc uptake gave an erroneous diagnosis of benignancy.

4099 MORPHOLOGY OF REPARATIVE PROCESSES IN THE EARLY PERIOD FOLLOWING CHEMICAL BURNS OF THE ESOPHAGUS. (Rus.) Sapozhnikova, M. A. (N. V. Sklifosovskii Scientific Research Inst. First Aid, Moscow, USSR). *Arkh. Patol.* 37(8):25-32; 1975.

4100 CAUSES AND TREATMENT OF INFLAMMATION OF AN ARTIFICIAL ESOPHAGUS. (Rus.) Zhupan, V. F. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Vestn. Khir.* 115(9):83-87; 1975.

4101 RADICAL TREATMENT OF FAILURES OF ACHALASIA SURGERY. (Ita.) Gioffre, L.; Bertolotti, A. (Istituto di II Patologia Chirurgica, Universita di Roma, Rome, Italy). *Chir. Gastroenterol.* 9(2): 151-159; 1975.

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4108 HIATAL HERNIA INCIDENTALLY DETECTED IN THE COURSE OF INDIRECT ANTICOAGULANT MANAGEMENT. (Ita.) Raso, A. M. (II Cattedra di Clinica Chirurgica Generale e di Terapia Chirurgica, Universita di Torino, Turin, Italy). *Minerva Chir.* 30(21):1098-1102; 1975.

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4110 EARLY RELAPSING HEMORRHAGE FROM ESOPHAGEAL VARICES WITH A FUNCTIONING PORTAL SYSTEM SHUNT. (Ita.) Peracchia, A.; Roncoroni, R. (Istituto di Clinica Chirurgica Generale e Terapia Chirurgica I, Universita di Parma, Parma, Italy). *Acta Chir. Ital.* 31(3):375-381; 1975.

4111 ESOPHAGEAL INVOLVEMENT IN SLCERODERMA. (Ita.) Querci della Rovere, G.; Agugiaro, S.; Motton, G.; Fracastoro, G.; Gandolfi, P.; Cordiano, C. (Istituto di Patologia Speciale Chirurgica e Propedeutica Clinica, Universita di Padova, Padova, Italy). *Acta Chir. Ital.* 31(3):405-415; 1975.

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Malaga, Malaga, Spain). *Med. Clin. (Barcelona)* 63(9):467-472; 1974.

4115 ANALYSIS OF RADIOGRAPHIC, ENDOSCOPIC, BIOPSY AND CYTOLOGIC DATA OF 80 ESOPHAGEAL CARCINOMAS. (Por.) Estima-Martins, A. M.; Catita, A. C. (Faculdade de Medicina do Porto, Porto, Portugal). *Arq. Gastroenterol. Sao Paulo* 12(4):227-232; 1975.

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4117 POSTVAGOTOMY DYSPHAGIA. (Ger.) Ihasz, M. (Semmelweis Medical Univ., H-1088 Budapest, Baross u. 23-25, Hungary). *Zentralbl. Chir.* 100(10): 603-607; 1975.

4118 CALCIFICATION OF THE WALL OF A DIVERTICULUM IN THE DISTAL SEGMENT OF THE ESOPHAGUS. (Ger.) Koelling, K. (Strahlenabteilung, Stadt. Auguste-Viktoria-Krankenhaus Berlin-Schonberg, 1 Berlin 41, Rubensstrasse 125, Germany). *Forstschr. Roentgenstrahl.* 122(6):558-559; 1975.

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See also, 4006, 4053, 4055, 4075, 4480, 4569.

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STOMACH

4120 GASTRIC ANTRAL DIAPHRAGM. (Eng.) Cho, K. J. (Univ. Michigan at Wayne County General Hosp., Eloise, MI 48132). *Gastrointest. Radiol.* 1(1):37-40; 1976.

Roentgenographic abnormalities in three patients (a 50-yr-old woman, a 57-yr-old man, and a 55-yr-old woman) with antral diaphragm are presented. The apertures were 3.0 mm-1.2 cm in diameter and were 1-3 cm proximal to the pylorus. Barium studies revealed the diaphragm to be a persistent, circumferential defect, often associated with peptic ulcers or gastric outlet obstruction. At endoscopy, the central aperture did not change during peristalsis, in contrast to the pylorus, which changes. Although the mucosa of the diaphragm has been normal in most of the previously reported cases, gastroscopy revealed erosion and erythema of the antral mucosa in these patients. Since surgical excision of the antral diaphragm can cure the patient's symptoms, a correct diagnosis by both upper gastrointestinal examination and endoscopy is important.

4121 GASTRIN RESPONSE TO CALCIUM AND SECRETIN INFUSION IN PATIENTS WITH ACHLORHYDRIA. (Eng.) Turnipseed, W. D.; Keith, L. M., Jr.; Takeuchi, O. (Ohio State Univ. Coll. Medicine, Columbus, OH). *Surg. Forum* 26:355-357; 1975.

Gastric pH was determined in 15 patients with achlorhydria, and the effect of calcium and secretin infusions on gastrin concentrations was studied. The mean gastric pH in the achlorhydric patients was 7.1, while the mean pH in 15 controls was 1.9. The basal gastrin levels in the patients with achlorhydria was 891 pg/ml, while that in the controls was only 84 pg/ml. In the patients with achlorhydria with no demonstrable antral disease, the mean gastrin level was 1,509 pg/ml, while in the achlorhydric patients with severe antral gastritis, it was only 185 pg/ml. A 200% increase in the gastrin concentration occurred after i.v. calcium infusion in three achlorhydric patients with pernicious anemia without antral gastritis. No response occurred in two patients with pernicious anemia with antral gastritis, one patient with atrophic gastritis without antral involvement, two patients with atrophic gastritis with antral involvement, or in eight controls. Secretin depressed gastrin levels by 25-35% in patients and controls. The results suggest that gastric pH directly influences the production and/or release of gastrin, that severe antral disease depresses gastrin levels, and that antral mucosal cells with altered endocrine function may exist in pernicious anemia.

4122 EROSIVE HEMORRHAGIC GASTRODUODENITIS WITH FIBRINOLYSIS AND LOW FACTOR XIII. (Eng.) Nilsson, I. M.; Bergentz, S.-E.; Wiklander, O.; Hedner, U. (Malmo General Hosp., Univ. Lund, Malmo, Sweden). *Ann. Surg.* 182(6):677-682; 1975.

The case reports and the results of platelet and coagulation studies and of fibrinolytic studies performed in four patients with erosive hemorrhagic gastroduodenitis and high fibrinolytic activity of the gastric juice are presented. No increase in the fibrinolytic activity could be demonstrated in the circulating blood. However, the values found for fibrinogen, plasminogen, and α_2-macroglobulin were 0.25-0.45 g/100 ml (normal 0.20-0.40 g/100 ml), 35-60% (normal 60-140%), and 49-74% (normal 80-120%), resp. A high content of fibrin/fibrinogen degradation products (FDP; 7.5-38 μg/ml, normal 0-10 μg/ml) was found in the serum. All patients had a markedly decreased content of factor XIII (6-13 U, normal l-31 U). Platelet count and other coagulation omponents were normal. These findings were interreted as signs of local fibrinolysis in the lseased parts of the gastrointestinal canal. The leeding stopped after p.o. and i.v. administration f a fibrinolytic inhibitor and of factor XIII-ontaining concentrate. In bleeding from gastrouodenal ulcer and esophageal varices, no increase n gastric fibrinolytic activity was found. The high ocal fibrinolytic activity in the stomach in erosive astritis together with the low content of factor III may contribute substantially to the hemorrhage n this condition. These observations may lead to revision of the treatment of such cases.

123 PATTERNS OF GASTRITIS IN ALCOHOLICS.

(Eng.) Pitchumoni, C. S.; Glass, G. B. J. New York Medical Coll., New York, NY 10029). *ol. Gastroenterol. (Paris)* 9(1):11-16; 1976.

ucosal biopsies were obtained simultaneously by lber-gastroscopy from the fundus and antrum of 100 lcoholics (daily consumption of over 200 g of thanol for an average of 13 yr) and from 80 nonaloholic, age- and sex-matched controls. In the erum of the controls and 61 of the alcoholics and n normal rat gastric mucosa, parietal cell antiodies were determined. Moderate or severe antral astritis with no or only mild fundic lesions was ound in 46 alcoholics, while 25% of the controls ad this lesion. Early or advanced atrophic fundal astritis was the only lesion in 12 alcoholics. In ne controls, superficial fundic gastritis was ound in 17%, and advanced fundic gastritis was ound in 4%. Although the fundic mucosa was normal n 61 of the alcoholics, that of the antrum was noral in only 26 alcoholics. Chronic alcohol abuse ignificantly increases the incidence of chronic ntral gastritis ($p<0.005$). The prevalence of parital cell antibody was similar in the controls and n the 61 alcoholics tested, both men (6.5 and 7%, esp.) and women (13.5 and 10%, resp.). The prealence of the antibody occurred in 6.7% of the hronic alcoholics with normal mucosa, in 10% of ne alcoholics with superficial gastritis, and in 7.5% of those with combined fundal and antral gasritis. As an extension of the Strickland nomenlature, the authors propose the designation "type B" gastritis for the group of cases with involveent of the antrum and fundus.

124 HETEROGENEITY IN SUSCEPTIBILITY TO CHRONIC GASTRITIS IN RELATIVES OF GASTRIC CANCER ATIENTS WITH DIFFERENT HISTOLOGY OF CARCINOMA.

Eng.) Kekki, M.; Ihamaki, T.; Sipponen, P.; ovinen, E. (Dept. Medicine, Univ. Helsinki, Helinki, Finland). *Scand. J. Gastroenterol.* 10(7): 37-745; 1975.

he morphological state of gastric body mucosa was xamined in 269 first-degree relatives of 64 index atients with gastric carcinoma and in 142 subjects elected at random. Gastric carcinoma was divided nto three groups according to histological properies: carcinoma mucocellular (diffuse type carcinoma, producing intracellular mucins), carcinoma adenomatosum (intestinal type, malignancies displaying well-formed adenomatous structure), and carcinoma anaplasticum (poor histological structural differentiation, poor formation of mucin). The state of gastric body mucosa was divided into five stages: normal and superficial gastritis and slight, moderate, and severe atrophic gastritis. The results were subjected to the numerical analysis based on the stochastic theory. The term "age-adjusted score" (AAS) defines the individual susceptibility to chronic gastritis. In terms of AAS, the material could be divided into high and low gastritis risk families. The subjects belonging to carcinoma mucocellular index patient families had a significantly higher susceptibility to chronic gastritis (mean AAS-0.51 ± 1.18) than the other relatives examined (-0.12 ± 0.97 and 0.08 ± 1.29 for carcinoma adenomatosum and anaplasticum, resp.). These families were also significantly concentrated in the group of high risk families. The heterogeneity of the relatives of gastric cancer patients, as regards their gastritis risk, should be taken into account in future epidemiological studies. These findings support the genetic approach to studies concerning a gastritis-gastric cancer relation.

4125 EFFECT OF GASTRIC BYPASS ON GASTRIC SECRETION.

(Eng.) Mason, E. E.; Munns, J. R.; Kealey, G. P.; Wangler, R.; Clarke, W. R.; Cheng, H. F.; Printen, K. J. (Univ. Hosp., Univ. Iowa, Iowa City, IA 52242). *Am. J. Surg.* 131(2): 162-168; 1976.

The effect of gastric bypass on acid secretion in morbidly obese patients without acid peptic disease was investigated. Four studies were conducted: indwelling pH; standard analyses of gastric juice obtained from the excluded distal stomach; serum gastrin determinations obtained before and after a standard meal, pre- and postoperatively; and the incidence of stomal ulceration in patients who had undergone gastric bypass. Twelve of 28 patients had a low fasting pH before and after gastric bypass, and stomal ulceration developed in 2 of these patients. Histalog stimulation (50 mg) decreased the high fasting pH in seven patients, but had no effect on eight others. Gastric aspiration studies from the distal pouch show a decrease in gastric acid secretion in comparison to collections from the entire stomach, which had been obtained preoperatively. The pH remained well within the acid range. In the analysis of serum gastrin data, two separate quadratic curves were fitted to the pre- and postoperative data of eight patients. Statistical comparison of the curves yields an exact F of 4.63 with 3 and 5 degrees of freedom ($p<0.062$). Individual comparisons of the mean, linear, and quadratic components of the curves yielded: F(1,7); mean, 7.501 ($p<0.028$); linear, 2.211 ($p<0.179$); and quadratic, 8.810 ($p<0.020$). Overall comparison of preoperative to postoperative curves yielded an F that was nearly significant at the 5% level. The results indicate that acid secretion is reduced after gastric bypass, but that the acid, unbuffered by food in the excluded stomach, results in a lowered gastrin secretion after a meal.

4126 PSEUDOLYMPHOMA OF THE STOMACH. (Ger.) Struwe, O. (Medizinische Klinik der Stadtischen Kliniken, D-6100 Darmstadt, Grafenstr. 9, W. Germany). *Leber Magen Darm* 5(6):249-255; 1975.

Diagnostic, morphological, epidemiological, prognostic, therapeutic, and nosological aspects of pseudolymphoma of the stomach are reviewed in connection with four new cases. Predominantly pleomorphic pseudolymphoma was diagnosed in a 55-yr-old woman who underwent exploratory laparotomy for suspected gastric carcinoma. Predominantly monomorphic pseudolymphoma was found in a 30-yr-old man undergoing gastrectomy for major hematemesis and in a 29-yr-old man hospitalized for melena and hematemesis. Monomorphic pseudolymphoma was also found in a 79-yr-old woman presenting with unspecific abdominal complaints for 20 yr. Highly pronounced lymphocyte infiltration in follicular and diffuse pattern; sclerosis in the mucosa, submucosa, and muscularis propria; chronic inflammation and edema of the perigastric lymph nodes; and absence of pathological mitoses are the morphological and cytological characteristics of pseudolymphoma. The nonspecific symptoms (abdominal pain, emesis, anorexia, weight loss, anemia, hematemesis, and melena) suggest gastric ulcer or neoplasia. Therefore, pseudolymphoma can only be diagnosed by microscopic examination of the resected specimen and not by clinical, x-ray, or endoscopic examination. Surgery, with or without postoperative irradiation, is the therapy of choice. The prognosis is good with a 5-yr survival rate of 70-100%. Malignant transformation into gastric lymphoma is highly unlikely. Lymphatic hyperplasia of the gastric mucosa can be secondary to chronic gastric ulcer, or it may precede erosion and ulceration. Distinction between ulcerative pseudolymphoma and lymphatic hyperplasia is possible by microscopic examination of the fundus.

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4128 HEMODYNAMIC AND METABOLIC SHIFTS DEPENDING ON THE VOLUME OF GASTRODUODENAL BLOOD LOSS. (Rus.) Shifrin, G. A.; Neshmonina, O. A. (Kharkov Scientific Research Inst. General and Emergency Surgery, Kharkov, USSR). *Khirurgiia (Mosk.)* (7):15-20; 1975.

4129 LOCAL HYPOTHERMIA OF THE STOMACH IN CASES OF PROFUSE GASTRODUODENAL HEMORRHAGES. (Rus.) Machavariani, G. A. (Tbilisi Medical Inst., Tbilisi, USSR). *Khirurgiia (Mosk.)* (7):12-15; 1975.

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4136 MALIGNANT GLOMUS TUMORS OF THE STOMACH. (Rus.) Apatenko, A. K.; Smol'iannikova, A. A. (Central Pathoanatomical Lab., Central Militar Medical Admin., USSR Ministry of Defense, Moscow, USSR). *Arkh. Patol.* 37(6):29-36; 1975.

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4171 SOME CLINICO-BIOCHEMICAL INDICES IN PATIENTS WITH CHRONIC GASTRITIS ACCOMPANIED BY SECRETORY INSUFFICIENCY. (Rus.) Kushmanova, O. D.; Bukach, R. K.; Dneprova, T. I. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Klin. Med. (Mosk.)* 53(8):51-55; 1975.

4172 RADIOLOGICAL OBSERVATIONS OF DIGESTIVE TRACT AFTER TOTAL GASTRECTOMY AND BETA ANASTOMOTIC OPERATION BY THE METHOD OF NAKAYAMA. (Pol.) Kulicz, A.; Gryglicki, J. (Zaklad Radiologii Sl. AM, 41-900 Bytom, ul. Piekarska 15, Poland). *Pol. Przegl. Rad. Med. Nukl.* 39(2):169-174; 1975.

4173 UPPER GASTROINTESTINAL HEMORRHAGE IN THE ELDERLY. REPORT OF 165 CASES. (Fre.) Lamy, J.; Chometovski, Y.; Fiastre, Y.; N'Guyen-Cat, J.; Bourde, J.; Assadourian, R. (Clinique chirurgicale B, groupe hospitalier de la Timone, Marseille, France). *Chirurgie* 101(10):756-761; 1975.

4174 EARLY POSTOPERATIVE COMPLICATIONS AFTER PARTIAL GASTRECTOMY. (Fre.) Francillon, J.; Baudet, B.; Tissot, E.; Pasquier, Ph.; Vignal, J. (Clinique chirurgicale A, Hopital Edouard Herriot, 69374 Lyon Cedex 2, France). *Chirurgie* 101(10):722-733; 1975.

4175 ENDOSCOPY AND TRACKING OF GASTRIC CANCER. (Fre.) Liguory, Cl.; Coffin, J.-Ch.; Suarez, A. (Hopital Saint-Antoine, 184, rue du Faubourg Saint-Antoine, 75571 Paris Cedex 12, France). *Ann. Gastroenterol. Hepatol.* 11(5):371-381; 1975.

4176 MACROSCOPIC AND MICROSCOPIC CLASSIFICATION OF GASTRIC CANCER. (Spa.) Smok, G.; Csendes, A.; Kubo, T. (Hospital J. J. Aguirre, Universidad de Chile, Chile). *Acta Gastroenterol. Latinoam* 6(4):149-155; 1974.

See also, 3825, 3861, 3865, 3873, 3993, 4001, 4009, 4011, 4012, 4015, 4017, 4018, 4026, 4046, 4047, 4052, 4053, 4062, 4065, 4069, 4075, 4076, 4083, 4088, 4106, 4108, 4109, 4112, 4114, 4116, 4187, 4194, 4195, 4206, 4207, 4210, 4237, 4238, 4239, 4251, 4306, 4540, 4542, 4543, 4550, 4553, 4569.

STOMACH

Peptic Ulcers

4177 PATTERNS OF GASTRIN COMPONENTS IN SERUM DURING FEEDING IN NORMAL SUBJECTS AND DUODENAL ULCER PATIENTS. (Eng.) Stadil, F.; Rehfeld, J. F.; Christiansen, L. A.; Malmstrom, J. (Rigshospitalet, 2100 Copenhagen, Denmark). *Scand. J. Gastroenterol.* 10(8):863-868; 1975.

The contribution of the different gastrin components to the gastrin response to a protein-rich meal was studied in 12 normal subjects and in 16 patients with duodenal ulcers. Pooled or individual samples of venous blood, drawn at intervals, were fractionated on Sephadex G 50 superfine columns of various lengths. Total gastrin immunoreactivity and concentrations of various components were measured radioimmunochemically. The changes in total serum concentration of immunoreactive gastrin were principally due to changes in component II (big gastrin) and III (little gastrin). The predominant pattern in both groups was an early increase in component III and a later and smaller increase in component II. Total gastrin response was largest in the patients with duodenal ulcer, and this was due mainly to component III. Fasting samples also showed a relatively higher concentration of component III in the ulcer patients. The results indicate that little gastrin is the more important component in the gastrin response to stimulation by food. Serum concentrations of total gastrin immunoreactivity are alike in normal subject and duodenal ulcer patients, but the findings indicate that increased levels of little gastrin may be characterisitic of duodenal ulcer disease. Since little gastrin is more potent than big gastrin, this would agree with the hypersecretion of acid in duodenal ulcer.

4178 SERUM GASTRIN AND SECRETIN LEVELS AFTER THE EXALTO-MANN-WILLIAMSON PROCEDURE. (Eng.) Tasse, D. P.; Kolts, B. E.; McGuigan, J. E.; Woodward, E. R.; Dragstedt, L. R. (College Medicine, Univ. Florida, Gainesville, FL 32610). *Arch. Surg.* 110(12):1482-1484; 1975.

To investigate the mechanism by which the Exalto-Mann-Williamson procedure consistently produces gastric acid hypersecretion and peptic ulceration in experimental animals, serum gastrin and secretin levels were determined in three dogs before and 3 weeks after undergoing the procedure. There was no significant change in serum gastrin. Serum secretin concentrations increased to 2.5 times the preoperative value (mean 66 pg/ml preoperatively and 165 pg/ml postoperatively), probably secondary to the enhanced secretion of gastric acid. The results of this experiment do not support the theory that alterations in circulating secretin or gastrin levels are responsible for the gastric acid hypersecretion following the Exalto-Mann-Williamson operation.

4179 CIMETIDINE IN DUODENAL ULCER: CONTROLLED TRIAL. (Eng.) Blackwood, W. S.; Pickard, R. G.; Maudgal, D. P.; Lawrence, D.; Northfield, T. C. (St. James's Hosp., London, England). *Lancet* 2(7978):174-176; 1976.

Preliminary results of a double-blind controlled clinical trial on the effects of cimetidine in patients with duodenal ulcers are reported. Repeat endoscopy in 21 patients completing 2 weeks of treatment with either cimetidine (1.6 g/day, p.o.) or placebo (lactose) revealed that the ulcers of 3 of the 9 patients on cimetidine and 1 of the 12 patients on placebo had healed. In 23 patients who completed 6 weeks of treatment, the ulcers in 9 of the 11 patients on cimetidine and in 3 of the 12 patients on placebo healed ($p<0.025$). The two cimetidine-treated patients whose ulcers had not healed at 6 weeks showed ulcer healing at endoscopy at 12 weeks. Of those who completed 12 weeks of treatment, all seven patients on cimetidine showed ulcer healing, but only three of the eight patients taking placebo showed healing ($p<0.05$). The ulcers of 5 of 10 patients of 1.6 g of cimetidine daily and of 7 of 13 patients on 0.8 g daily healed after 6 weeks of treatment, which was not a statistically significant difference. There were no significant changes from initial values for hemoglobin or WBC count in 27 patients who received cimetidine (0.8 or 1.6 g/day) or placebo for 6 weeks. Neutrophil counts, platelet counts, and alkaline phosphatase levels did not change significantly during treatment in any of the patients tested (25, 26, and 23 patients, resp.). No changes were observed on routine testing of the urine for glucose, blood, or albumin. Serum creatinine was significantly increased in the 13 patients who received 1.6 g/day of cimetidine for 6 weeks (85 ± 14 μM before treatment; 99 ± 12 μM after treatment), as was SGOT (22 ± 5.9 μM before; 31 ± 10.7 μM after treatment) in 12 patients on 1.6 g/day and SGPT (20 ± 6.8 μM before; 32 ± 17.3 μM after treatment) in 12 patients on the same dose. None of these changes was seen in the patients who received placebo or the lower dose of cimetidine. The results suggest that cimetidine at either dose is equally effective in achieving the healing of duodenal ulcers. The elevations in SGOT, SGPT, and serum creatinine emphasize the need to continue close clinical surveillance in patients taking cimetidine.

4180 NONASSOCIATION OF ADRENOCORTICOSTEROID THERAPY AND PEPTIC ULCER. (Eng.) Conn, H. O.; Blitzer, B. L. (Veterans Admin. Hosp., West Haven, CT). *N. Engl. J. Med.* 294(9):473-479; 1976.

A retrospective analysis of 42 studies and 5,331 patients of whom 2,985 were treated with adrenocorticosteroids was conducted to determine whether steroid therapy is associated with an increased prevalence of peptic ulcer. In 26 double blind investigations of 3,558 patients, peptic ulcers were reported in 1% of 1,491 controls and in 1.4% of the 2,067 steroid-treated patients. The rates of hemorrhage from peptic ulcer and of perforation of peptic ulcer were similar in the two groups. In 16 non-double blind investigations of 1,773 patients, peptic ulcer was more frequent in the steroid treated (1.1%) than in the control group (0.4%). When the double blind and non-double blind results were combined, the frequency of peptic ulcer was slightly higher in the steroid group. In the double blind study, the average daily dose of steroid or placebo was 19 mg of prednisone or its equivalent, and the mean duration of therapy was 97 days. Treatment with steroid for more than 30 days was associated with significantly more peptic ulcers than treatment for a month or less ($p<0.05$). An association was seen between peptic ulcers and the total dose of steroid administered. In patients who had received more than 1,000 mg of prednisone, peptic ulcer developed far more frequently than in those who were given smaller doses ($p<0.001$). Although patients who received more than 1,000 mg of placebo also had more ulcers than those who received smaller total doses of placebo ($p<0.001$), the rate of ulcer was higher in the large-dose steroid group (5.3%) than in the large dose placebo group (2.5%) ($p<0.05$). The data of the double blind studies suggest that the frequency of peptic ulcer is not increased by treatment with steroids. The non-double blind investigations show a slightly increased occurrence of peptic ulcer among the steroid treated patients.

4181 EFFECT OF FATTY ACIDS ON THE STIMULATED GASTRIC SECRETIONS IN MAN. (Eng.)

Schmidt-Wilcke, H. A.; Steinhagen, P.; Steinhagen, E.; Martini, G. A. (St. Franziskus-Hospital, II. Med. Abteilung, Hohenzollernring 72, D-44 Munster, W. Germany). *Digestion* 13(1/2):8-14; 1975.

The effect of C_8 to C_{18} fatty acids and their Na or K salts on the pentagastrin-stimulated gastric secretion in 28 healthy men and 12 radiologically-healed duodenal ulcer patients was examined. Pentagastrin (1.5 mg kg/hr in a NaCl solution, i.v.) was infused for seven 15-min periods. The gastric content was collected with a suction pump and divided into 15-min samples. After three 15-min periods, the test solutions or emulsions were administered intraduodenally by a single 5-min injection. Gastric secretion was reduced to 50% of the stimulated plateau following the administration of 10 ml of pure oleic acid. The duration of this inhibition exceeded 40 min. Three ml of oleic acid had the same inhibitory effect, but the duration was only 15 min. No effect was observed with doses less than 3 ml. However, 0.5 ml of oleic acid in a 20-ml saline emulsion produced the same effect as 3 ml of pure oleic acid. Sodium stearate and palmitate slightly reduced gastric secretion for about 40 min. Myristate had no effect. Caprinate and caprylate induced inhibitions with a mean intensity of 64 and 80%, resp., that of oleic acid with durations of about 30 min. The effects of laurate were similar to caprylate and caprinate, except for an observed secretory rebound. The author suggests these and other findings indicate that there may be various receptors in the duodenum that reduce acid flow and inhibit gastric emptying.

4182 GASTRIC GLYCOPROTEINS IN CHRONIC PEPTIC ULCER. (Eng.)

Roberts-Thomson, I. C.; Clarke, A. E.; Maritz, V. M.; Denborough, M. A. (Univ. Melbourne, Dept. Medicine, Melbourne, Australia). *Aust. N.Z. J. Med.* 5(6):507-514; 1975.

The output and concentration of gastric glycoproteins in gastric juice from patients with chronic duodenal (9), gastric ulcer (8), and from controls (10) were determined in the basal state and following pentagastrin (6 μg/kg) stimulation. The basal acid output (BAO) was significantly higher in patients with duodenal ulcer ($p<0.05$), and significantly lower in patients with gastric ulcer ($p<0.05$), than in controls. Maximal acid output (MAO) was significantly lower in patients with gastric ulcer ($p<0.005$) compared to controls. The patients with gastric ulcer had a significantly higher basal glycoprotein output ($p<0.05$), basal glycoprotein concentration ($p<0.02$), and stimulated glycoprotein concentration ($p<0.05$) than controls. There was no significant correlation between BAO and basal glycoprotein output in controls ($p>0.1$), patients with duodenal ulcer ($p>0.1$), or patients with gastric ulcer ($p>0.1$). No significant correlation between MAO and stimulated glycoprotein output in controls ($p>0.1$), patients with duodenal ulcer ($p>0.1$), or patients with gastric ulcer ($p>0.1$) was seen. The basal and stimulated glycoprotein output in gastric juice from patients with duodenal ulcer and from controls was independent of ABO blood group and secretor status. The principal carbohydrate components of gastric juice were galactose, N-acetylglucosamine, fucose, N-acetylgalactosamine, and sialic acid. The carbohydrate composition of the glycoproteins varied according to the BAO blood group and secretor status of the individual. The results show significant differences in either gastric glycoprotein output or concentration in patients with duodenal ulcers, compared with controls.

4183 CAUSES OF DEATH IN PATIENTS WITH GASTRIC ULCERS. (Eng.)

Lindskov, J.; Nielsen, J.; Amdrup, E.; Christiansen, P.; Fenger, C.; Jensen, H.-E.; Nielsen, S. A. D. (Kommunehospitalet, Copenhagen, Denmark). *Acta Chir. Scand.* 141(7):670-675; 1975.

The causes of death in 180 of 701 patients with gastric ulcers admitted to hospital during 1955-1964, and who died within 5 years from the time of admission, were determined. Causes of death were established at autopsy in 66% of the cases, and were derived from death certificates for the other 34%. Mortality was grouped by sex and age of the patients, and the causes of death were compared with the corresponding sex and age groups of the Copenhagen population. Mortality was significantly higher in the sample than in the general population, both for men and for women; within the 5-yr period, twice as many men and 2.5 times as many women died than expected. Observed mortality from gastric ulcer was 75 times higher in the nonsurgical group and 65 times higher in the surgical group. Gastric ulcer was the most significant cause of the observed higher mortality, but mortality from other diseases was also significantly higher than expected, both in men and in women. Mortality from suicide was significantly higher than expected in women. In men, pulmonary disease involved a significantly higher mortality than expected. If patients dying from cancer of the stomach within a 2-yr period are excluded, mortality from this disease was not significantly higher than expected. The study gives no support to the theory that benign gastric ulcers are prone to malignant degeneration.

4184 EARLY CLINICAL EXPERIENCE WITH METIAMIDE, A HISTAMINE H_2-RECEPTOR ANTAGONIST, IN PATIENTS WITH DUODENAL ULCER. (Eng.) Thompson, M. H.; Reed, J. D.; Dale, G.; Venables, C. W. (Royal Victoria Infirmary, Newcastle upon Tyne, NE1 4LP, England). *Am. J. Dig. Dis.* 20(12):1135-1141; 1975.

The clinical, endoscopic, and biochemical effects of metiamide, a histamine H_2-receptor antagonist, in therapeutic dosages were investigated in a 28-day open trial in 14 patients with duodenal ulcer. Eleven patients participated in two, single dose studies. Five patients took 200 mg metiamide four times daily, and six patients took 300 mg metiamide four times daily for 28 days. Clinical, hematological, and biochemical analyses were made at weekly intervals. Thirteen patients completed the study; 5 patients were symptomatic on day 0, 3 on day 7, 3 on day 14, and none on day 21. One patient's symptoms returned on day 28. Twelve patients underwent endoscopy. Ten had healed ulcers, and there was a reduction in ulcer size in the two patients where ulcers remained. The plasma creatinine rose from a mean of 0.96 to a mean of 1.19 for the group as a whole. There was a significant ($p>0.02$) rise in the SGOT and serum lactate dehydrogenase (LDH, $p>0.01$) in the group as a whole. The LDH rise was dose dependent ($p<0.05$ for the 300-mg dose and $p>0.07$ for the 200-mg dose), while the SGOT rise was not. There was a significant rise in the mean cardiothoracic ratio from 39.4 to 41.3 ($p<0.01$). The overall change in the fasting serum gastrin level was not significant. At a follow-up review, 1 month or more after the last drug treatment, five patients were symptomatic, four of whom had originally healed their ulcers. The results show that metiamide produces considerable symptomatic relief and a high rate of ulcer healing (72%) after 28 days of therapy.

4185 ULTRASTRUCTURE OF CELL MIGRATION THROUGH THE GASTRIC EPITHELIUM AND ITS RELATIONSHIP TO BACTERIA. (Eng.) Steer, H. W. (Southampton General Hosp., Southampton, England). *J. Clin. Pathol.* 28(8):639-646; 1975.

The migration of polymorphonuclear leukocytes and lymphocytes through the gastric mucosa was investigated by electron microscopy. Gastric biopsies were obtained from 8 patients at surgery for gastric ulceration, and tissue was obtained at gastroscopy from 39 patients with gastric ulceration. Polymorphonuclear leukocytes migrated from blood capillaries in the gastric mucosa through the gastric epithelium into the gastric lumen. They were frequently located at the periphery of the capillaries, and were often associated with strands of fibrin in the blood vessels. Small lymphocytes migrated from lymphoid follicles through the mucosal connective tissue, traversing the underlying basal lamina to enter the gastric epithelium. The lymphocytes lie between the epithelial cells and migrated through the epithelium into the gastric lumen. Bacteria were frequently related to the gastric epithelium. Some polymorphonuclear leukocytes that had migrated into the gastric lumen contained phagocytosed bacteria, which have similar ultrastructural characteristics to the bacteria that are related to the gastric epithelium. The bacteria in polymorphonuclear leukocytes were situated within membrane-bound vesicles, which are continuous with the generalized membrane system of the polymorphonuclear leukocyte. In addition to the bacterium, the vesicles contained electron dense granules (2 nm in diameter), which were found irregularly distributed in the cytoplasm of the polymorphonuclear leukocyte. This investigation, which did not include any immunological study, failed to reveal any obvious etiological factors for the lymphocytic migration.

4186 ON THE ENZYMATIC ACTIVITY OF BLOOD SERUM OF PATIENTS WITH PEPTIC ULCER DEPENDING ON THE METHOD OF SURGICAL TREATMENT. (Rus.) Romaniak, M. I.; Seniutovich, V. F.; Genyk, S. N.; Shevchuk, M. G. (Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Klin. Khir.* (12):6-9; 1975.

4187 GASTRIC CANCER FOLLOWING SURGERY FOR PEPTIC ULCER. (Rus.) Maksumov, D. N.; Khodzhimetov, A. K. (All-Union Scientific Research Inst. Experimental and Clinical Surgery, Moscow, USSR). *Khirurgiia (Mosk.)* (9):17-19; 1975.

4188 GASTRODUODENAL PEPTIC ULCER DISEASE. (Fre.) van der Hoeden, R.; Dumont, A. (Institut Medico-chirurgical d'Ixelles, Rue Jean Paquot 61, B-1050 Brussels, Belgium). *Acta Gastroenterol. Belg.* 38(11/12):410-418; 1975.

4189 PSYCHOLOGICAL ASPECTS OF ULCEROUS GASTROINTESTINAL DISEASES. (Fre.) Berkowitch, S. (Hopital Universitaire Saint-Pierre, Rue Haute 322, B-1000 Brussels, Belgium). *Acta Gastroenterol. Belg.* 38(11/12):419-430; 1975.

4190 PSYCHOANALYTICAL NOSOGRAPHY AND DIGESTIVE PATHOLOGY. (Fre.) Luminet, D. (Departem. de Psychologie Medicale et de Medecine Psychosomatique de l'Universite de Liege, Boulevard de la Constitution 153, B-4000 Liege, Belgium). *Acta Gastroenterol. Belg.* 38(11/12):403-409; 1975.

4191 VAGOTOMY AND PYLOROPLASTY IN PATIENTS WITH DUODENAL ULCER IN DECREASED ACID PRODUCTION. (Rus.) Zhupan, V. F.; Satsukevich, V. N. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Vestn. Khir.* 115(8):17-20; 1975.

4192 SECRETORY, MOTOR FUNCTION AND THE CONDITION OF THE DUODENAL MUCOSA IN PATIENTS WITH DUODENAL ULCER AND DUODENITIS. (Rus.) Esenin, V. I.; Sokolova, G. N.; Gorodinskaia, V. S. (Central Scientific Research Inst. Gastroenterology, Principal Administration of Moscow Municipal Executive Committee, Moscow, USSR). *Klin. Med. (Mosk.)* 53(6):90-99; 1975.

4193 PROGRESS IN THE THERAPY OF DUODENAL ULCER. REDUCED CURE TIME WITH HIGH DOSES OF METOCLOPRAMIDE (PASPERTIN). (Ger.) Schuetz, E. (Landshuter Str. 19, D-8400 Regensburg, W. Germany). *Munch. Med. Wochenschr.* 118(8):231-234; 1976.

4194 GASTROMUCOPROTEIN SECRETION FOLLOWING DRAINAGE OPERATIONS ON THE STOMACH IN ASSOCIATION WITH VAGOTOMY FOR ULCER DISEASE. (Rus.) Nechiporuk, V. M.; Ryzhanovskaia, V. M. (N. I. Pirogov Vinnitsa Medical Inst., Vinnitsa, USSR). *Klin. Khir.* (11):13-16; 1975.

4195 ELECTROLYTIC BALANCE AND SECRETORY FUNCTION OF THE STOMACH IN PATIENTS WITH ULCER DISEASE. (Rus.) Romaniak, M. I.; Senyutovich, V. F.; Shevchuk, M. G.; Genyk, S. N.; Pugachev, A. D.; Kryzhanovskii, N. A. (Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Klin. Khir.* (11):16-19; 1975.

4196 SECONDARY RESULTS OF TREATMENT OF PERFORATING GASTRODUODENAL ULCERS. (Rus.) Knysh, N. T.; Knysh, P. K.; Mikhailov, V. S.; Diud'kin, E. F. (District Hosp. Pechora Station, Sosnogorsk Northern Railroads, Pechora, USSR). *Klin. Med. (Mosk.)* 53(11):35-37; 1975.

4197 EXPERIENCE IN DETERMINING PEPTIC ULCER RISK IN MASS SCREENING OF THE POPULATION USING A TABLE OF DIAGNOSTIC RATIOS. (Rus.) Zaitseva, R. I. (Crimean Medical Inst., Simferopol, USSR). *Vrach. Delo* (8):91-94; 1975.

4198 IMMUNOLOGICAL REACTIONS DUE TO SURGICAL TREATMENT IN PATIENTS WITH PEPTIC ULCER. (Rus.) Tsesarenko, V. I. (Kharkov Medical Inst., Kharkov, USSR). *Vrach. Delo* (7):9-11; 1975.

4199 GASTRODUODENAL ULCER IN PATIENTS WITH CHRONIC UNSPECIFIED DISEASES OF THE BRONCHOPULMONARY TRACT. (Rus.) Komarov, F. I.; Ilinich, V. K.; Lichak, A. Ia.; Tolokonnikova, M. I.; Snytkin, A. E. (First Moscow Medical Inst., Moscow, USSR). *Vrach. Delo* (7):15-18; 1975.

4200 SOME ASPECTS OF SURGERY FOR CHRONIC GASTRODUODENAL ULCER. (Rus.) Savel'ev, V. S.; Berezov, Iu. E. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (7):3-7; 1975.

4201 PEPTIC ULCER IN CHILDREN AND ADOLESCENTS. (Rus.) Pipia, I. K.; Telia, A. V. (Tbilisi Medical Inst., Tbilisi, USSR). *Khirurgiia (Mosk.)* (7):7-12; 1975.

4202 EFFECT OF CHOLINE-BLOCKING AGENTS ON THE FIBRINOLYTIC SYSTEM OF THE BLOOD IN PATIENTS WITH PEPTIC ULCER. (Rus.) Lapchinskii, I. D. (Kiev Medical Inst., Kiev, USSR). *Vrach. Delo* (8):76-81; 1975.

4203 SURGICAL TREATMENT OF PEPTIC ULCERS AFTER GASTROENTEROSTOMY. (Rus.) Sitenko, V. M.; Samokhvalov, V. I.; Kurygin, A. A. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Vestn. Khir.* 115(8):3-7; 1975.

4204 SOME NEUROHUMORAL DISORDERS IN PATIENTS WITH COMPLICATED PEPTIC ULCER. (Rus.) Samson, E. I. (Chernovtsy Medical Inst., Chernovtsy, USSR). *Klin. Med. (Mosk.)* 53(8):39-43; 1975.

4205 AMINO ACID COMPOSITION OF THE BLOOD SERUM IN PATIENTS WITH COMPLICATED GASTRIC AND DUODENAL ULCER. (Rus.) Shkodich, N. P. (Chemerovets Central Hosp., Khmelnitski Oblast, Chemerovets, USSR). *Klin. Khir.* (12):10-13; 1975.

4206 VASCULAR TISSUE PERMEABILITY IN THE GASTRIC MUCOSA IN PATIENTS WITH EXACERBATION OF PEPTIC ULCER. (Rus.) Aruin, L. I.; Nikitin, G. A. (Central Scientific Res. Inst. Gastroenterology, Moscow, USSR). *Klin. Med. (Mosk.)* 53(6):81-85; 1975.

4207 INVESTIGATION OF THE MOTOR FUNCTION OF THE STOMACH IN PEPTIC ULCER IN THE PRE- AND POSTOPERATIVE PERIOD USING ELECTROGASTROGRAPHY (Rus.) Ageenko, V. A.; Astrakhan, I. Ia. (Irkutsk Medical Inst., Irkutsk, USSR). *Klin. Khir.* (9):11-14; 1975.

4208 LACTASE OF SMALL INTESTINE MUCOSA AND TOLERANCE OF DAIRY PRODUCTS IN PEPTIC ULCER PRIOR TO AND AFTER ORGAN-PRESERVING OPERATIONS WITH VAGOTOMY. (Rus.) Shershevskii, M. G.; Nishchii, V. A.; Beliaevskaia, L. A. (Novokuznetsk Inst. Postgraduate Training Physicians, Novokuznets USSR). *Klin. Med. (Mosk.)* 53(11):48-51; 1975.

4209 PROLONGED CONSERVATIVE TREATMENT IN PEPTI ULCER. (Rus.) Grigor'ev, P. Ia.; Triige I. I.; Ledoshchuk, B. A.; Tarasov, D. I.; Iakovenko E. P. (Blagoveshchensk Medical Inst., Blagoveshchensk, USSR). *Klin. Med. (Mosk.)* 53(11):51-56; 1975.

4210 INDICES OF INTRAGASTRIC pH-METRY IN COMPLICATED ULCER DISEASE. (Rus.) Chernobrovyi, V. N. (Chernovtsy Medical Inst., Chernovtsy, USSR). *Vrach. Delo* (12):18-22; 1975.

4211 DYNAMICS OF SOME VEGETATIVE-VASCULAR REACTIONS IN ULCER DISEASE BEFORE AND AFTER CONSERVATIVE TREATMENT. (Rus.) Pshenichnaia, Z. M. (Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Vrach. Delo* (12):22-25; 1975.

4212 IMMEDIATE RESULTS OF PERFORATION OF GASTRODUODENAL ULCERS. (Spa.) Ferreira Montero, V.; Martinez Laganga, A. (Ciudad Sanitaria Jose Antonio, Zaragoza, Spain). *Med. Clin. (Barc.)* 64(6): 307-310; 1975.

4213 EARLY COMPLICATIONS OF TRUNCAL AND SELECTIVE VAGOTOMY AND DRAINAGE OPERATION IN TREATMENT OF CHRONIC DUODENAL ULCER. (Pol.) Szalach, E.; Lewicki, K.; Sawicki, S. (Instytut Chirurgii AM, ul. Prof. Z. Kieturakisa 1, 80-742 Gdansk, Poland). *Wiad. Lek.* 29(2):89-94; 1976.

4214 LATE RESULTS OF TREATMENT OF PERFORATED DUODENAL ULCER BY VAGOTOMY AND PYLOROPLASTY. (Pol.) Soltysiak, A. (Instytut Chirurgii Ak. Med., ul. Wolczanska 195, 90-531 Lodz, Poland). *Wiad. Lek.* 29(2):85-87; 1976.

4215 RADIOENDOSCOPIC CORRELATIONS IN DUODENAL ULCER. STUDY OF 223 CASES. (Fre.) Guerre, J.; Chopita, N.; Kouchner, B.; Warnet, J.; Pergola, F.; Christoforov, B.; Duflo, B.; Aghay, A. (Services de Clinique Medicale, Hopital Cochin, 27, rue du Fg Saint-Jacques, 75674 Paris Cedex 14, France). *Ann. Gastroenterol. Hepatol.* 11(4):283-290; 1975.

4216 METIAMIDE IN DUODENAL ULCER [Letter to Editor]. (Eng.) Earlam, R. (London Hosp., Whitechapel, London E1 1BB, England). *Lancet* 2(7942):973-974; 1975.

4217 COMPARATIVE ASSESSMENT OF THE RESULTS OF BILLROTH I AND BILLROTH II GASTRIC RESECTION IN PEPTIC ULCER OF THE STOMACH AND DUODENUM. (Rus.) Soinov, N. N. (Tiraspol Medical Inst., Tiraspol, USSR). *Klin. Khir.* (4):53-56; 1976.

See also, 3832, 4003, 4006, 4046, 4059, 4065, 4067, 4081, 4083, 4092, 4138, 4144, 4237, 4284, 4382, 4445, 4550.

SMALL INTESTINE

4218 ADENOCARCINOMA OF THE SMALL INTESTINE ARISING IN CROHN'S DISEASE: DEMONSTRATION OF A TUMOR-ASSOCIATED ANTIGEN IN INVASIVE AND INTRAEPITHELIAL COMPONENTS. (Eng.) Newman, R. D.; Bennett, S. J.; Pascal, R. R. (Greenwich Hosp., Greenwich, CT 06830). *Cancer* 36(6):2016-2019; 1975.

The case of a 67-yr-old man in whom an intestinal obstruction with coexisting regional enteritis and an invasive adenocarcinoma associated with an area of intra-epithelial neoplasia is reported. The surgical specimen consisted of approximately 45 cm of edematous, focally hemorrhagic, irregularly dilated, and constricted thickened ileum with serosal hemorrhage and areas of fibrinopurulent exudate. The cells of the adenocarcinoma and the intra-epithelial neoplasia contained a tumor-associated surface antigen capable of reacting with an antiserum prepared against a colonic carcinoma. The finding of a tumor-associated antigen on "atypical" epithelium in juxtaposition to the invasive carcinoma supports the suggestion that the focus of "atypia" is intra-epithelial neoplasia or preinvasive carcinoma.

4219 AMINO ACID PATTERN IN PLASMA BEFORE AND AFTER JEJUNO-ILEAL SHUNT OPERATION FOR OBESITY. (Eng.) Backman, L.; Hallberg, D.; Kallner, A. (Dept. Surgery, Karolinska Sjukhuset, Stockholm, Sweden). *Scand. J. Gastroenterol.* 10(8):811-816; 1975.

The amino acid pattern in plasma before and after jejuno-ileal shunt operation for obesity was investigated in a reference group (26), and in three groups of massive, obese subjects (9, 8, and 9, resp.). The three groups of obese subjects (A, B, and C, resp.) had different rates of weight loss and varying degrees of complications. Two different surgical methods were used: jejuno-ileostomy end-to-side and jejuno ileostomy end-to-end plus ileocecostomy end-to-side. There were no statistically significant differences between the three groups with regard to preoperative weight, weight after 52 weeks, or body height. All but two subjects in group B and all in group C had abnormal serum electrolytes or abnormal bilirubin, aspartate-aminotransferase, and alanine-aminotransferase postoperatively, and were hospitalized periodically.

There were no complications in group A. The concentrations of lysine, tyrosine, ½ cystine, and glutamic acids were higher in the obese subjects than in the reference group, while asparagine, glutamine, serine, and glycine were lower than in the reference group. During the postoperative period, the amino acid pattern changed significantly. Serine, glycine, and taurine increased, and valine, lysine, leucine, tryptophan, tyrosine, ½ cystine, and citrulline decreased. The amino acid pattern in the obese group with the longest postoperative observation time and a stable body weight differed significantly from that in the reference group only with regard to a low valine concentration and high concentration of taurine and glutamic acid. The results show that the obese subjects had a preoperative amino acid pattern that was significantly different from that in the reference group.

4220 SYMPTOMATIC HYPOGLYCAEMIA, LIVER GLYCOGEN DEPLETION AND CIRRHOSIS FOLLOWING JEJUNO-ILEAL BYPASS FOR GROSS OBESITY. (Eng.) Wilcox, R. G. (General Hosp., Nottingham, England). *Br. J. Surg.* 63(1)30-32; 1976.

A new complication following jejuno-ileal bypass for gross obesity is described. The patient, a 32-yr-old woman, suffered from hypoglycemic attacks that were associated with total depletion of liver glycogen together with a progressive micronodular cirrhosis. Increased dietary protein and calorie content (diet containing 3,000 calories and 100 g protein) relieved her symptoms and restored liver glycogen, but had no effect on the development of the cirrhosis over the next 12 months. It is concluded that the increased protein in this patient's diet contributed significantly to gluconeogenesis, as there was no identifiable improvement in glucose absorption.

4221 GLOMUS TUMOR OF THE DUODENUM. (Rus.) Portnoi, L. M.; Gracheva, K. P.; Kriuchkova, G. S.; Maiskii, V. B. (M. F. Vladimirskii Moscow Oblast Scientific Research Inst. and Clinic, Moscow, USSR). *Arkh. Patol.* 37(8):73-74; 1975.

4222 THE ABERRANT PANCREAS IN MECKEL'S DIVERTICULUM. (Rus.) Smirnov, E. A. (V. N. Rozanov Pushkino Central District Hosp., Pushkino, USSR). *Arkh. Patol.* 37(8):71-72; 1975.

4223 SOME PROBLEMS OF DIAGNOSIS AND TREATMENT OF INTESTINAL INVAGINATION. (Rus.) Zubov, D. S.; Khatsko, V. V. (Donetsk Medical Inst., Donetsk, USSR). *Vrach. Delo* (9):98-101; 1975.

4224 DETERMINATION OF LENGTH OF SMALL INTESTINE IN EXTENDED RESECTIONS. (Rus.) Umanskaia, V. V.; Estis, E. E. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (7):66-69; 1975.

4225 DIAGNOSIS AND TREATMENT OF INTESTINAL CHOLELITHIC OBSTRUCTION. (Rus.) Kliminskii, I. V.; Shapoval'iants, S. G. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Vestn. Khir.* 115(8):35-39; 1975.

4226 DUODENAL DIVERTICULUM. (Rus.) Myshkin, K. I.; Skopets, M. D. (Saratov Medical Inst., Saratov, USSR). *Khirurgiia (Mosk.)* (7):20-23; 1975.

4227 EFFICACY OF BACTERIAL PREPARATIONS--BIFIDUMBACTERIN AND BIFICOL IN THE TREATMENT OF CHRONIC ENTEROCOLITIS COMPLICATED BY DYSBACTERIOSIS. (Rus.) Krums, L. M.; Zhukovskaia, N. A.; Semenova, L. P.; Goncharova, G. I.; Pospelova, V. V.; Rakhimova, N. G. (Central Inst. Gastroenterology, Moscow, USSR). *Ter. Arkh.* 47(8):86-89; 1975.

4228 ORGAN TRANSPLANTATION IN SURGERY OF THE GASTROINTESTINAL TRACT: A THING OF THE PAST OR OF THE FUTURE? (Ger.) Largiader, F. (Kantonsspital, CH-8091 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 106(9):281-285; 1976.

4229 INTESTINAL PLACEMENT OF MILLER-ABBOTT-TUBES UNDER ENDOSCOPIC GUIDANCE. (Ger.) Meissner, K.; Weissenhofer, W. (Landeskrankenanstalten, Mullner Hauptstrasse 48, A-5020 Salzburg, Austria). *Endoscopy* 8(1):10-14; 1976.

4230 ACUTE COMPLICATIONS OF DISTURBANCES OF THE INTESTINAL ROTATION IN ADULTS. (Ger.) Ziegler, A.; Akovbiantz, A. (Chirurgische Klinik, Stadtspital Waid, CH-8037 Zurich, Switzerland). *Helv. Chir. Acta* 42(4):575-578; 1975.

4231 RARE COMPLICATIONS OF OPERATIVE INTESTINAL SPLINTAGE WITH MILLER-ABBOTT PROBE. (Ger.) Spelsberg, F.; Salzmann, G.; Kuntz, R. (Chirurgische Klinik der Universitat Munchen, Munich, W. Germany). *Chirug* 46(9):430-431; 1975.

4232 PRIMARY MALIGNANT NEOPLASMS OF THE DUODENUM. (Spa.) Quiroz, F.; Guevara, L.; Cardenas, S.; Herrera, C.; Revilla, A.; Kershenobich, D. (Departamento de Gastroenterologia, Instituto Nacional de la Nutricion, Av. San Fernando y Viaducto, Tlalpan, Mexico 22, D.F.). *Rev. Invest. Clin.* 27(4):281-287; 1975.

4233 BENIGN TUMORS OF THE SMALL INTESTINE. REPORT OF 5 CASES. (Fre.) Favre, J.-P.; Petiot, A.; David, M.; Viard, H. (Clinique Chirurgicale, Faculte de Medecine, Hopital du Bocage, 21000 Dijon, France). *Ann. Chir.* 28(9):725-729; 1974.

4234 LATE RESULTS OF TREATMENT FOR CHRONIC DUODENAL OBSTRUCTION. (Rus.) Makokha, N. S.; Miklashevich, A. I. (M. I. Kalinin Omsk Medical Inst., Omsk, USSR). *Vestn. Khir.* 115(12):39-41; 1975.

4235 COMPLICATIONS OF CHOLEDOCHODUODENOSTOMY. (Ita.) Scalfari, A.; Rocca, E. (Ospedale Civile "A. Pugliese," Catanzaro, Italy). *Chir. Gastroenterol.* 9(2):196-205; 1975.

4236 ENTERAL ABSORPTION OF ASCORBIC ACID IN MAN AFTER APPLICATION OF A MICRO-ENCAPSULATED RETARD PREPARATION. (Ger.) Brenner, G. (Abteilung fur Biochemische Forschung, Firma Johann A. Wulfing, 404 Neuss, Stresemannallee 6, W. Germany). *Med. Klin.* 70(28/29):1219-1222; 1975.

4237 ETIOPATHOGENETIC ASPECTS OF ACUTE GASTRODUODENAL ULCERATION DUE TO STRESS IN FOUR CASES. (Ita.) Mingrone, F. (Ospedale Civile di Catanzaro, Catanzaro, Italy). *Chir. Gastroenterol.* 9(2):232-242; 1975.

4238 DUODENOGASTRIC REFLUX AFTER VAGOTOMY AND PYLOROPLASTY. (Ger.) Rothmund, M.; Deisler, G.; Kaufmann, A.; Hoehn, P. (Chirurgische Universitatsklinik, D-6500 Mainz 1, Langenbeckstrasse 1, W. Germany). *Langenbecks Arch. Chir.* 340(3):167-178; 1976.

4239 ENTEROCHROMAFFIN CELLS OF THE DUODENAL MUCOSA AND THEIR EFFECT ON GASTRIC ACID FORMATION. (Rus.) Uspenskii, V. M.; Ivashkin, V. T.; Dorofeev, G. I. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Klin. Med. (Mosk.)* 53(11):37-41; 1975.

4240 PRINCIPLES OF NUTRITION FOLLOWING EXTENDED RESECTION OF THE SMALL INTESTINE. (Ger.) Shmerling, D. H. (Univ.-Kinderklinik, Kinderspital, Steinwiesstr. 75, CH-8032 Zurich, Switzerland). *Monatsschr. Kinderheilkd.* 124(5):358-361; 1976.

4241 METABOLIC STUDIES FOLLOWING SUBTOTAL RESECTION OF THE SMALL INTESTINE. (Ger.) Baehr, R.; Niessen, K. H.; Koch, J.; Osswald, P.; Flach, A.; Lehmann, O. (Chirurgische Universitatsklinik, D-7400 Tubingen, W. Germany). *Monatsschr. Kinderheilkd.* 124(5):362-363; 1976.

4242 LACTOSE-FREE DIET IN ACUTE ENTERITIS IN INFANCY. (Ger.) Fahr, K.; Nuetzenadel, W. (Univ.-Kinderklinik, D-6900 Heidelberg, W. Germany). *Monatsschr. Kinderheilkd.* 124(5):389-390; 1976.

4243 CHRONIC SUBILEUS DUE TO DOUBLE INVAGINATION IN LEIOMYOMA IN MECKEL'S DIVERTICULUM. (Ger.) Fischer, W.; Rahnfeld, P. (Bezirkskrankenhaus Neubrandenburg, Verbereitungsgruppe, 20 Neubrandenburg, Sponholzer Strasse, Barackendreieck, E. Germany). *Z. Aertztl. Fortbild. (Jena)* 69(12):657-659; 1975.

4244 RECENT DATA ON THE PATHOLOGY AND PHYSIOLOGY OF DIGESTIVE ENZYMES. EXPERIMENTAL SURGICAL ANALYSIS OF THE FACTORS REGULATING THE LEVEL AND DISTRIBUTION OF THE ENZYMATIC AND TRANSPORT ACTIVITIES IN THE SMALL INTESTINE. (Cze.) Ugolev, A. M.; Gruzdkov, A. A.; Jezuitova, N. N.; Timofeeva, N. M.; Lesogor, V. M. (Institut fyziologie I. P. Pavlova Akademie ved SSSR, Leningrad, USSR). *Cesk. Gastroenterol. Vyz.* 29(8):527-534; 1975.

4245 EARLY POSTOPERATIVE INTESTINAL MOTILITY IN NEOSTOMIZED PATIENTS. (Spa.) Cascon, A. D.; Amezcua, J. M. M.; Bernales, L.; Romero, J. H.; Diez-Cascon Mendendez, E. (Seguiridad Social "Francisco Franco," Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(6):735-750; 1976.

4246 COMPLICATIONS OF DISEASES OF MECKEL'S DIVERTICULUM. (Ger.) Leisering, W. (Chirurgische Klinik, Medizinische Akademie, DDR-50 Erfurt, Nordhauser Str. 74, E. Germany). *Zentralbl. Chir.* 100(24):1505-1508; 1975.

4247 LATE RESULTS OF NOBLE OPERATION. CLINICAL AND RADIOLOGICAL FOLLOW-UP. (Ger.) Dinstl, K.; Lechner, G.; Riedl, P.; Schiessel, R. (I. Chirurgische Universitatsklinik, Allg. Krankenhaus der Stadt Wien, Alser Str. 4, A-1097 Vienna IX, Austria). *Munch. Med. Wochenschr.* 118(29/30):941-944; 1976.

4248 ADAPTATIVE POSSIBILITIES OF THE SMALL INTESTINAL MUCOSA TO INTRALUMINAL ENVIRONMENTAL CHANGES. (Ger.) Menge, H.; Robinson, J. W. L.; Riecken, E. O. (Medizinische Universitatsklinik, Mannkopffstrasse 1, D-3550 Marburg/Lahn, W. Germany). *Z. Gastroenterol.* 14(3):420-433; 1976.

4249 TOXIC MEGA-ILEUM--RECURRENCE OF ULCERATIVE COLITIS IN THE SMALL INTESTINE FOLLOWING COLECTOMY? (Ger.) Malchow, H.; Schmeisser, W.; Schomerus, H.; Doelle, W.; Durst, J.; Reifferscheid, P.; Pirschel, J.; Herzer, R.; Schmidt-Moormann, P. (Medizinische Univ.-Klinik, Abt. I, D-7400 Tubingen, W. Germany). *Z. Gastroenterol.* 14(3):388-399; 1976.

4250 ABNORMAL POSITION OF THE INTESTINE AS THE CAUSE OF RECURRENT EMESIS IN CHILDREN. (Ger.) Faerber, D. (Kinderroentgenabteilung, Kinderklinik der TU, Kolner Platz 1, D-8000 Munich 40, W. Germany). *Monatsschr. Kinderheilkd.* 124(5):342-343; 1976.

4251 DIVERTICULI OF THE GASTROINTESTINAL TRACT. (Rus.) Leshchenko, V. M.; Alekseenko, A. A.; Minin, V. V. (Donets Medical Inst. at First Municipal Hosp., Donetsk, USSR). *Vrach. Delo* (12):30-33; 1975.

See also, 3820, 3825, 3853, 4010, 4029, 4065, 4068, 4069, 4122, 4128, 4129, 4130, 4131, 4134, 4139, 4140, 4146, 4161, 4163, 4173, 4181, 4192, 4253, 4254, 4255, 4286, 4299, 4329, 4385, 4488, 4537, 4541, 4542, 4565, 4569, 4579.

SMALL INTESTINE

Malabsorption

4252 BIRD-FANCIER'S LUNG AND JEJUNAL VILLOUS ATROPHY. (Eng.) Berrill, W. T.; Fitzpatrick, P. F.; Macleod, W. M.; Eade, O. E.; Hyde, I.; Wright, R. (Southampton Univ. Hosps., Southampton, England SO9 4PE). *Lancet* 2(7943):1006-1008; 1975.

Sixteen patients with bird-fancier's lung were screened for evidence of celiac disease by assessing their clinical features, RBC or serum folate levels, and serum for reticulin antibodies. Of nine patients with clinical or laboratory features that indicated the presence of malabsorption, two had total jejunal villous atrophy and three had subtotal villous atrophy; the case reports of these patients are presented. The two patients with total villous atrophy had no symptoms of malabsorption. Very low serum immunoglobulin A (IgA, <25 mg/dl) and high IgG (1,800 mg/dl) occurred in one patient with subtotal villous atrophy, and high IgG (>1,900 mg/dl) and high IgA (560 mg/dl) occurred in one patient with total villous atrophy; the Ig levels were normal in the other patients. Four of the five patients responded to a gluten-free diet, and in one, a repeat jejunal biopsy showed a normal mucosa. This suggests that these cases were true examples of gluten-sensitive enteropathy. The authors propose that the lung lesion is due to precipitins produced as a result of inhaled avian antigen, while the intestinal lesion is a gluten-sensitive enteropathy, both being associated because of a basic mucosal defect. Another reason for the association between villous atrophy and bird-fancier's lung may be that ingested avian antigen, absorbed through the gastrointestinal tract, may be involved in the pathogenesis of the lung lesion; this is a possibility in two patients in whom the lung lesion recurred without known contact with birds. Despite the low frequency of overt bird-fancier's lung in celiac disease, subclinical pulmonary disease might result from the intestinal absorption of avian antigen.

4253 ACUTE ABDOMINAL COMPLICATIONS OF COELIAC DISEASE. (Eng.) Connon, J. J.; McFarland, J.; Kelly, A.; Biggart, J. D.; McLoughlin, J. (Belfast City Hosp., Belfast, Northern Ireland). *Scand. J. Gastroenterol.* 10(8):843-846; 1975.

Two patients with rare complications of celiac disease are described. The first patient, a 63-yr-old woman who had been treated with a gluten-free diet for nearly a year, had obstruction of 12 cm of the jejunum, produced by multiple focal areas of active ulceration. The mucosa had a pattern varying from subtotal to severe partial villous atrophy. Further symptoms of intestinal obstruction and dysphagia led to similar findings in the esophagus. This was unusual, as there had been no esophageal lesions 3 months earlier, when the patient was examined radiologically and endoscopically. The second patient, a 52-yr-old man who had a 7-yr history of dermatitis herpetiformis, presented with right-sided abdominal pain and watery diarrhea, the result of a perforation of the proximal jejunum. The perforation was caused by a 6 x 3-cm ulcer that was secondary to the development of a localized malignant reticulum sarcoma. Partial villous atrophy associated with excess numbers of lymphocytes, plasma cells, and eosinophils in the lamina propria was also found. These cases indicate the importance of recognizing the occurrence of acute abdominal emergencies arising in the course of celiac disease.

4254 THE DISTRIBUTION AND ENTERIC LOSS OF ^{51}Cr-LABELLED LYMPHOCYTES IN NORMAL SUBJECTS AND IN PATIENTS WITH COELIAC DISEASE AND OTHER DISORDERS OF THE SMALL INTESTINE. (Eng.) Douglas, A. P.; Weetman, A. P.; Haggith, J. W. (Royal Victoria Infirmary, Newcastle upon Tyne NE1 4LP, England). *Digestion* 14(1):29-43; 1976.

The migratory pattern of lymphocytes was studied in normal human subjects, in 13 patients with inflammatory bowel disease (9 with Crohn's disease, 3 with diarrhea not due to structural abnormality of the bowel, and 1 with acute tropical sprue), and in 8 patients with celiac disease. Peripherally harvested lymphocytes were labeled with ^{51}Cr and were then re-injected into the subjects. In nine normal subjects, fecal loss of lymphocytes was 0.20% over 5 days, whereas the fecal loss was 1.13% in five patients with untreated celiac disease; in Crohn's disease patients, it was 1.01%, and in five patients with intestinal lymphangiectasia, the loss was 0.61%. In the one patient with acute tropical sprue, enteric loss was 0.97%. In contrast to these findings, fecal loss was normal in the three celiac patients who were in remission on a gluten-free diet. An external counter revealed that the count rates steadily diminished in normal subjects, but increasing activity was recorded over the umbilicus, for 7 days after dose administration, in all disease

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tegories except of celiac disease patients who were ing treated. The loss of lymphocytes from the dy into the gut lumen demonstrates that the gut is lymphoid migratory compartment, which is open-ended d therefore of importance in assessing lymphocyte gration streams in the body. Prolonged excessive sses explain the immunological abnormalities found many of these conditions without implicating a imarily immune etiology for any of them. It is ggested that the development of malignancy in celiac sease, and possibly in Crohn's disease, may be nked to the continued loss of immunologically competent lymphocytes.

55 RELATIONSHIP OF LACTOSE INTOLERANCE TO MILK INTOLERANCE IN YOUNG CHILDREN. (Eng.)

rza, C.; Scrimshaw, N. S. (Dept. Nutrition and Food ience, Massachusetts Inst. Technology, Cambridge, MA 139). *Am. J. Clin. Nutr.* 29(2):192-196; 1976.

e prevalence of lactose intolerance was compared th the occurrence of intolerance to graded amounts milk (240, 360, and 480 ml) or equivalent amounts lactose (12, 18, and 24 g lactose in a peanut tter sandwich; PBL) in 69 Negro and in 30 Caucaan children. Of the Negro children studied, 11% those 4-5 yr old, 50% of those 6-7 yr, and 72% of ose 8-9 yr old were lactose intolerant, yet no ild was intolerant to 240 ml of milk. Of the ucasian children, 20% of those 8-9 yr were intolrant of lactose. The lactose-intolerant oup included 14 children, 9 of whom had posiive symptom responses to the PBL mixture or to milk, t had had no lactose tolerance test because consent uld not be obtained. Five of these children, who also d a blood glucose increase >20 mg/100 ml and marked mptoms after the standard lactose tolerance test se, demonstrated a blood glucose increase that was gnificantly lower ($p<0.025$) than that observed in ildren without symptoms. Twenty-one percent of the ctose-intolerant children had positive symptom reonses to 18 g of lactose in either whole milk or L. Among the 69 Negro children, one 9-yr-old child ported symptoms of intolerance at the 12 g level. significant differences were found between the lk intakes of Negro lactose-tolerant and lactosetolerant children, nor between the milk intakes 6- and 7-yr-old Negro and Caucasian children. wever, 8- to 9-yr-old Negro children drank signifiantly less milk than did 8- to 9-yr-old Caucasian ildren. The blood glucose response at 0, 20, and min after the ingestion of 2 g lactose/kg aximum 50 g) was unreliable as an indicator of individual's symptomatic response to lactose. mptomatic responses to greater amounts of milk not suggest that the frequency of primary lactose tolerance might be a reason for limiting existing lk programs for young children.

256 IgA DEFICIENCY IN ONE OF IDENTICAL TWINS.

(Eng.) Lewkonia, R. M.; Gairdner, D.; oe, W. F. (Hammersmith Hosp., London, England). *r. Med. J.* 1(6005):311-313; 1976.

he occurrence of selective immunoglobulin (Ig) A eficiency associated with a childhood illness resembling celiac disease in one of identical twin girls is reported. At age 6 months, both twins had an episode of gastroenteritis, which was less severe in the twin who was later found to be IgA-deficient (twin 1). Twin 1 continued to fail to thrive, and her symptoms were strongly suggestive of childhood celiac disease. This diagnosis was not sustained, however, because there was neither a clear clinical response to a gluten-free diet nor a relapse when gluten was reintroduced. Jejunal biopsies at age 13 revealed partial villous atrophy with round cell infiltration of the lamina propria and intra-epithelial lymphocytes in the mucosa of twin 1; the biopsy of twin 2 was normal. Immunoglobulin levels in both twins were first measured at age 23. A single radial immunodiffusion method showed that twin 2 was normal and that twin 1 had selective IgA deficiency, with a serum concentration of 0.02 g/l. Twin 1 probably had the deficiency since childhood, as her growth had remained retarded and she had recurrent sore throats. Dermatoglyphic ridge counts showed that the probability that the twins were monozygous was greater than 0.98. Identical serological results were obtained for 25 red cell antigens and 23 histocompatibility antigens. The authors suggest that the deficiency in twin 1 might be due to an inhibition of a class of B lymphocytes by specific suppressor T lymphocytes, perhaps induced by infection. The occurrence of IgA deficiency in one of identical twins suggests that the environment is important in either the initiation or the perpetuation of the deficiency in some people.

4257 DIARRHEA CAUSED BY A DEFICIT IN INTESTINAL DISACCHARIDES.

(Ita.) Auricchio, S. (2^a Facolta di Medicina e Chirurgia dell'Universita di Napoli, Naples, Italy). *Arch. Ital. Mal. Appar. Dig.* 37(3):185-187; 1975.

4258 OBSERVATION OF MYOCLONIC ENCEPHALOPATHY IN THE COURSE OF WHIPPLE'S DISEASE.

(Fre.) Masson, R.; Boulliat, G.; Clavel, M. (Clinique medicale C, Hotel-Dieu, 1, place de l'Hopital, F 69288 Lyon Cedex 1, France). *Rev. Neurol. (Paris)* 132(6):415-418; 1976.

4259 MALABSORPTION IN HBsAg-POSITIVE PERIARTERITIS NODOSA.

(Ger.) Doelle, W.; Wenig, W.; Schomerus, H.; Malchow, H.; Bundschu, D.; Herzer, R.; Pirschel, J.; Pfeiffer, J. (Abt. I der Medizinischen Univ. Klinik, Tubingen, D-7400 Tubingen, W. Germany). *Z. Gastroenterol.* 14(3):342-353; 1976.

4260 ACTIVITY OF DIPEPTIDASES AND MORPHOLOGY OF THE MUCOSA IN SMALL INTESTINAL MUCOSA BIOPSY.

(Ger.) Lentze, M.; Schaub, J.; Karms, K. (Kinderklinik der Universitat Munchen, Dr. von Haunerschen Kinderspital, Lindwurmstr. 4, D-8000 Munich, W. Germany). *Monatsschr. Kinderheilkd.* 124(5):369-371; 1976.

SMALL INTESTINE

4261 ANTIRETICULIN ANTIBODIES AND PRECIPITATING ANTIBODIES TO FOOD PROTEINS IN THE SERA OF CHILDREN WITH CELIAC DISEASE. (Ger.) Rotthauwe, H. W.; Sennekamp, J.; Emons, D.; Becker, M. (Universitats-Kinderklinik, D-5300 Bonn, Adenauerallee 119, W. Germany). *Eur. J. Pediatr.* 121(3):215-226; 1976.

4262 WHIPPLE'S DISEASE: STUDY OF THREE CASES, AND EPIDEMIOLOGICAL DATA. (Fre.) Capron, J. P.; Thevenin, A.; Delamarre, J.; Chivrac, D.; Dupas, J. L.; Remond, A.; Gontier, M. F.; Lorriaux, A. (Clinique Medicale A, Centre Hospitalier Universitaire, Place Victor Pauchet, 80000 Amiens, France). *Lille Med.* 20(9):842-845; 1975.

See also, 4012, 4016, 4034, 4220, 4534.

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LARGE INTESTINE

4263 CLEANSING OF THE COLON WITHOUT ENEMAS. (Eng.) Rosengren, J. E.; Aberg, T. (Dept. Radiology, Allmanna sjukhuset, S-214 01 Malmo, Sweden). *Radiologe* 15(11):421-426; 1975.

A nonenema method for the cleansing of the colon, which uses a magnesium sulfate salt solution (Salax) in combination with different oral laxatives (cascara sagrada, Dantron, bisacodyl) prior to roentgenographic examination, was developed. A total of 628 patients were prepared for colon examination: 365 received 30 mg cascarosides and 7.5 g magnesium sulfate, p.o. (224 were given castor oil and a water enema containing 150 mg cascarosides); 87 received magnesium sulfate alone; 87 received Salax and Dantron (50 mg each); and 89 received 3 bisacodyl pills of 5 mg each and 2 Salax powders containing 7.5 mg magnesium sulfate each. The presence or absence of feces was the sole method of evaluation. Only 27% of the patients prepared with castor oil and enemas were completely cleansed, while 66% of patients prepared with Salax and cascara were cleansed. Laxation with either Salax or cascara alone gave an unsatisfactory cleansing. Of the 224 patients who had been prepared with oral laxatives, 54 had been earlier prepared for colon examination with castor oil and enemas. Of these latter, 35 were better cleansed, 14 exhibited no more obvious difference, while 4 were less well cleansed with cascara-Salax. The time interval between ingestion of laxatives and colon examination was significant. The number of completely-cleansed patients prepared with morning and evening doses was greater than of those who received noon and evening doses. Side effects were reported by 24% of all patients, but were less marked after cascara-Salax than after castor oil and enemas. Older patients were less well cleansed than younger patients. The results show that cascara-Salax yields a better cleansing result than does the combination of castor oil and enemas.

4264 CARCINOEMBRYONIC ANTIGEN IN HEREDITARY ADENOMATOSIS OF THE COLON AND RECTUM. (Eng.) Alm, T.; Wahren, B. (St. Erik's Hosp., S-112 82 Stockholm, Sweden). *Scand. J. Gastroenterol.* 10(8):875-879; 1975.

The serum level of carcinoembryonic antigen (CEA) was determined in 130 individuals belonging to different families in which hereditary adenomatosis of the colon and rectum occurred. Fifty-six individuals were operated on with colectomy, 27 affected individuals were not operated on, and 47 were unaffected first degree relatives. Seventeen to 29% of the patients in each of these groups had moderately raised CEA serum levels compared to 25 unrelated healthy subjects. Since the serum values were low or only moderately raised (usually occurring between 0 and 10 ng/ml, and exceeding 20 ng/ml in only one affected patient without cancer) and occurred in all groups, the determination of serum levels cannot be generally used to indicate malignant transformation of adenomas. However, assays of the tissue CEA content in six histologically verified adenomas showed values similar to those of overt colonic carcinomas. This opens up possibilities of investigating the CEA activity in serum and tissues of chosen individuals with hereditary adenomatosis of the colon and rectum.

4265 CLINDAMYCIN-ASSOCIATED COLITIS: REVIEW OF THE CLINICAL SPECTRUM OF 47 CASES. (Eng.) Tedesco, F. J. (Univ. Miami Sch. Medicine, P.O. Box 875, Biscayne Annex, Miami, FL 33152). *Am. J. Dig. Dis.* 21(1):26-32; 1976.

Clindamycin-associated colitis was studied in 47 patients who received the antibiotic either p.o. (31), i.v. (8), or i.m. (1). Of the 47 patients, 13 (28%) had significant underlying illness: carcinoma (5), diabetes (4), and amyotrophic lateral sclerosis, leukemia, rheumatoid arthritis, and chronic renal failure (1 each). Forty of the patients were clinically well with complete proctoscopic resolution, at 4-16 months after the diagnosis of pseudomembranous colitis. Seven patients died. All of the patients were treated initially with bowel rest, lomotil, and i.v. fluids including electrolytes and albumin, if necessary. In this series, the most common clinical signs consisted of watery diarrhea, crampy abdominal pain, fever, and leukocytosis. These presenting symptoms were so severe in nine of the patients that surgical intervention was considered. Early proctoscopic examination prevented unnecessary exploratory laparotomy in these cases. It is concluded that patients who receive clindamycin should be observed carefully for the development of diarrhea. If it occurs, prompt proctoscopic examination should be performed; if colitis is found, the antibiotic should be discontinued immediately, and vigorous supportive therapy should be instituted.

4266 FAMILY STUDIES IN CANCER OF THE COLON AND RECTUM.

(Eng.) Lovett, E. (St. Mark's Hosp., London, England). *Br. J. Surg.* 63(1):13-18; 1976.

To examine the pattern of incidence of large bowel neoplasia in relatives, family histories were obtained from 209 patients undergoing treatment for cancer of the colon or rectum. Death certificates were obtained for parents and siblings who had died. The probability that the cause of death had been certified as cancer of the large bowel was calculated for each relative for whom a death certificate had been obtained. In all the groups of first degree relatives, there was a significant increase ($p<0.01$) in the number of deaths due to large bowel cancer compared with the number that could be expected in the general population. In deaths of both male and female relatives, carcinoma of the bowel was the most frequent malignancy. The increase in gastric carcinoma, although not so marked as the increase in large bowel carcinoma, was unexpected. Among the 209 index cases, 55 individuals had one or more adenomas present, as well as a carcinoma in the surgical specimen. Of these, 17 had a positive family history. The average age of diagnosis of large bowel cancer was 60.5 yr for men and 62.7 yr for women. Only eight patients were aged 40 or under when large bowel cancer was diagnosed; five of these had affected relatives. The presence of adenoma as well as carcinoma, a history of primary carcinoma, and an early age of onset of carcinoma are all associated with the likelihood that a patient has relatives who have also had large bowel cancer.

4267 COLONIC LYMPHANGIOMA.

(Eng.) Lawson, J. P.; Myerson, P. J.; Myerson, D. A. (Griffin Hosp., 130 Division St., Derby, CT 06418). *Gastrointest. Radiol.* 1(1):85-89; 1976.

Eight previously reported cases of colonic lymphangioma are reviewed, and three new cases are reported. Six of the eight previous cases were described as pedunculated, sessile, or polyploidal mucosal lesions. The first newly reported patient, a 50-yr-old woman, was found to have a multicystic, soft, gelatinous lesion measuring 1.5 x 1.5 x 2 cm in the region of the ileocecal valve. A stalk was noted, extending through the valve from the cecum. This is the only reported case in which the retrograde prolapse of a colonic lymphangioma into the terminal ileum was demonstrated radiologically. A 2-cm subepithelial lymphangioma was found in the hepatic flexure of the second patient, a 68-yr-old woman, who presented with hematochezia. A slightly lobulated, cyst-like lymphangioma occurred in the third patient, a 50-yr-old woman, who presented with intestinal cramps, nausea, vomiting, and diarrhea. Lymphangioma has occurred in eight of the 11 cases, and only one of the 11 patients was younger than 40 yr.

4268 PHARMACOLOGICAL CHARACTERISTICS OF THE GANGLIONIC AND AGANGLIONIC COLON IN HIRSCHSPRUNG'S DISEASE.

(Eng.) Penninckx, F.; Kerremans, R. (Univ. Clinics St. Raphael, Leuven, Belgium). *Life Sci.* 17(9):1387-1394; 1975.

The pharmacological characteristics of circular and longitudinal muscle strips from normal and aganglionic colon were investigated *in vitro* in 13 patients with Hirschsprung's disease. At least six strips were prepared from both the aganglionic and ganglionic colon in each patient. Drugs were added to the strips in either a single or cumulative dose. The sensitivity for acetylcholine (10^{-9}-10^{-3} M), noradrenalin (10^{-8}-10^{-4} M), and isoproterenol (10^{-8}-10^{-4} M) was normal in aganglionic tissue. Concentrations of bethanechol (10^{-8}-10^{-5} M), carbacholine (10^{-6}-10^{-5} M), metacholine (10^{-5}-10^{-4} M), and pilocarpine (10^{-4} M) induced stronger contractions in aganglionic strips than in normal strips. Concentrations of serotonin (10^{-7}-10^{-3} M) had an inhibitory effect in strips from both the proximal and distal segments. Concentrations of nicotine (10^{-5}-10^{-3} M), lobeline (10^{-7}-10^{-4} M), and dimethylphenylpiperazinium iodide (10^{-8}-10^{-4} M) did not induce a relaxation in aganglionic muscle strips. All strips contracted after histamine (10^{-5} M), but the contractions were stronger in aganglionic strips. It is concluded that there are no pharmacological arguments and no explanations for spasticity of the distal aganglionic colon, and that the type of denervation differs from that described elsewhere.

4269 IMMUNOGLOBULIN E IN RECTAL MUCOSA OF PATIENTS WITH PROCTITIS.

(Eng.) Heatley, R. V.; Calcraft, B. J.; Fifield, R.; Rhodes, J.; Whitehead, R. H.; Newcombe, R. G. (General Hosp., Nottingham, England). *Lancet* 2(7943):1010-1012; 1975.

Tissue and serum immunoglobulins (Ig) were measured by a direct immunofluorescence technique in 12 patients with chronic proctitis. Twelve samples were taken during the active disease, and six were taken during clinical remission, which was induced by topical treatment with disodium cromoglycate. (D.S.C.G.). These samples were compared with 10 samples from normal, control patients. Large numbers of brightly fluorescent IgE-producing cells were seen in specimens from patients, both in remission (median, 22; range, 4->50/high-power field) and during the active disease (median, 37; range, 8->50); the control values ranged between zero and one poorly fluorescent cells per high-power field. Specimens from the proctitis patients also contained many brightly fluorescent IgG- and IgM-producing cells, both in remission (median, 16; range, 0->50 IgG-producing cells and median, 4; range, 1-25 IgM-producing cells) and during active disease (median, 8; range, 0-35 IgG-producing cells and median, 10; range, 1-40 IgM-producing cells), in comparison to controls (median, 2; range, 0-5 IgG-producing cells and median, 4; range, 1-9 IgM-producing cells). The demonstration of large quantities of IgE in the rectal mucosa with a clinical response to D.S.C.G. supports the view that an immediate hypersensitivity reaction is involved in the pathogenesis of proctitis.

4270 DIVERTICULOSIS OF THE SIGMOID COLON. (Ita.) Castiglioni, G. C.; Landi, E.; Fianchini, A. (Istituto di Clinica Chirurgica Generale e Terapia Chirurgica, Universita Cattolica del Sacro Cuore, Rome, Italy). *Chir. Gastroenterol.* 9(2):160-174; 1975.

4271 RADIOTHERAPY OF RECTAL CANCER: CURABILITY BY INTRACAVITARY IRRADIATION. (Fre.) Fond-Papillon, D. (Chaire de Radiologie, Faculte de Medecine de Lyon, Lyon, France). *Med. Chir. Dig.* 3(4):277-281; 1974.

4272 PARALYTIC AND MECHANICAL POSTOPERATIVE ILEUS. (Ger.) Largiader, F. (Chirurgische Universitatsklinik A, Kantonsspital, CH-8091 Zurich, Switzerland). *Helv. Chir. Acta* 42(5/6):771-778; 1975.

4273 VALUE OF SHORT DISTANCE COLONOSCOPY: EXPERIENCE WITH 200 CASES. (Fre.) Saigot, Th.; Tosoni-Pittoni, A.; Brule, J.; Perreau, G.; Bousquet, O.; Sarrazin, A. (Service d'Hepato-Gastro-Enterologie, La Salpetriere, Boulevard de l'Hopital, 75013 Paris, France). *Med. Chir. Dig.* 3(4):271-275; 1974.

4274 APPENDICITIS OF THE AGED. (Fre.) Monod-Broca, Ph. (Hopital de Bicetre, 78, rue du General Leclerc, 94270 Kremlin-Bicetre, France). *Rev. Prat.* 26(1):53-58; 1976.

4275 APPENDICULAR PERITONITIS: CLINICAL PICTURE, DIAGNOSIS, GENERAL PRINCIPLES OF TREATMENT. (Fre.) Lagache, G.; Dumont, J.-C. (Clinique Chirurgicale Adultes Est, Cite Hospitaliere, 59000 Lille, France). *Rev. Prat.* 26(1):25-30; 1976.

4276 ACUTE APPENDICITIS IN YOUNG ADULTS. (Fre.) Guivarc'h, M.; Benhamida, F. (Centre medico-chirurgical Foch, 40, rue Worth, 92151 Suresnes, France). *Rev. Prat.* 26(1):9-17; 1976.

4277 ON MELANOSIS OF THE LARGE INTESTINE. (Rus.) Derizhanova, I. S. (Rostov-na-Donu Medical Inst., Rostov-na-Donu, USSR). *Arkh. Patol.* 37(11): 54-59; 1975.

4278 DETECTION OF TUMORS OF THE LARGE INTESTINE USING COLONOSCOPY. (Rus.) Smagin, V. G.; Sokolov, L. K.; Ivanova, L. M.; Iukina, G. M.; Voshchanova, N. P. (Chief Admin. No. 4, USSR Ministry Health, Moscow, USSR). *Klin. Med. (Mosk.)* 53(11): 88-93; 1975.

4279 DIFFERENTIAL DIAGNOSIS OF ACUTE APPENDICITIS AND FEMALE GENITAL DISEASES. (Pol.) Kanigowski, K.; Wasielica, M. (Wojewodzki Szpital im. J. Sniadeckiego, ul. M. C. Sklodowskiej 26, 15-950 Bialystok, Poland). *Wiad. Lek.* 29(4):285-290; 1976.

4280 EIGHT CASES OF PROCTORRHAGIA OBSERVED AT AN INTERNAL MEDICINE CLINIC. (Fre.) Guerre, J.; Chopita, N.; Pequignot, H. (Service de Clinique Medicale, Hopital Cochin, 27, rue du Fg Saint-Jacques, 75014 Paris, France). *J. Med. Strasbourg* 6(14):853-854; 1975.

4281 PSEUDOMEMBRANOUS ENTEROCOLITIS OBSERVED AFTER TREATMENT WITH LINCOMYCIN OR CLINDAMYCIN. (Fre.) Heully, F.; Gaucher, P.; Bigard, M. A. (Service de Medecine C, Centre Hospitalier Regional de Nancy, Hopital de Brabois, 54500 Vandoeuvre-les-Nancy, France). *Ann. Gastroenterol. Hepatol.* 12(4):225-233; 1976.

4282 STENOSIS OF THE LARGE INTESTINE DUE TO ENDOMETRIOSIS IN AN APPENDECTOMY SCAR. (Ger.) Hofmann, H.; Scholz, P.; Wiedemann, F.-H. (Chirurgische Klinik, Bereich Medizin (Charite), Humboldt-Universitat, DDR-104 Berlin, Schumannstr. 20, E. Germany). *Zentralbl. Chir.* 101(1):58-61; 1976.

4283 CHARACTERISTICS OF SOME ABNORMALITIES OF TH LARGE INTESTINE. (Pol.) Kaszewska-Jablonska, I.; Gorska-Dubowik, M.; Sokol, A. (I Klinika Instytutu Chorob Wewnetrznych AM, Gdansk, Poland). *Pol. Tyg. Lek.* 30(26):1103-1106; 1975.

4284 CONTRIBUTION TO THE STUDY OF PNEUMATOSIS CYSTOIDES INTESTINALIS. (Spa.) Montero Gomez, M. (Hospital Provincial de Orense, Orense, Spain). *Galicia Clin.* 48(2):87-109; 1976.

4285 EVALUATION OF SOME IMMUNOLOGICAL INDICES IN CHRONIC ENTEROCOLITIS. (Rus.) Sil'chenko, T. S. (Dnepropetrovsk Scientific Research Inst. Gastroenterology, Dnepropetrovsk, USSR). *Vrach. Delo* (12):25-29; 1975.

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4286 ADHESIVE INTESTINAL OBSTRUCTION IN THE LIGHT OF IMMEDIATE AND LATE RESULTS. (Rus.) Zhitniuk, R. I. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Vestn. Khir.* 115(12): 42-45; 1975.

4287 AN APPENDICULAR FORM OF INTESTINAL Yersinia enterocolitica INFECTION. (Rus.) Antonov, V. I.; Strel'nikov, B. E.; Vishniakov, A. K. (Vladivostok Medical Inst., Vladivostok, USSR). *Vestn. Khir.* 115(12):32-34; 1975.

4288 CAUSES OF DEVELOPMENT OF PERITONITIS AFTER APPENDECTOMY. (Rus.) Rodionov, V. V.; Prikupets, V. L.; Chagaev, N. V. (N. A. Semashko Moscow Medical Inst. Stomatology, Moscow, USSR). *Vestn. Khir.* 115(12):28-32; 1975.

4289 NEW THERAPEUTIC DRUG FOR RECTAL DISEASES. (Ger.) Hein, K. E. (D-8000 Munich 19, Romanplatz 10a, W. Germany). *Munch. Med. Wochenschr.* 117(46):1857-1858; 1975.

4290 EPIDEMIOLOGICAL DATA ON APPENDICITIS. (Ger.) Pflanz, M. (Institut fur Epidemiologie und Sozialmedizin, Medizinische Hochschule, Karl-Wiechert-Allee 9, D-3000 Hannover, W. Germany). *Munch. Med. Wochenschr.* 118(29/30):933-936; 1976.

4291 MUCOUS COLITIS. (Ger.) Kratzsch, K.-H. (Bezirkskrankenhaus Karl-Marx-Stadt, Klinikum am Kuchwald, 90 Karl-Marx-Stadt, Burgerstrasse 2, E. Germany). *Z. Aerstl. Fortbild. (Jena)* 69(10):519-523; 1975.

See also, 3834, 3982, 3992, 3996, 4000, 4008, 4011, 4027, 4051, 4058, 4068, 4073, 4084, 4085, 4227, 4249, 4250, 4251, 4294, 4296, 4318, 4332, 4514, 4536, 4541, 4542, 4562, 4569.

LARGE INTESTINE

Ulcerative Colitis

4292 THE CONSTIPATING EFFECT OF DIPHENOXYLATE (RETARDIN^{R}) IN ULCERATIVE COLITIS: A DOUBLE-BLIND CONTROLLED TRIAL. (Eng.) Engbaek, J.; Ersboll, J.; Faurby, V.; Binder, V.; Riis, P. (Gentofte Hosp., Univ. Copenhagen, DK-2900 Hellerup, Denmark). *Scand. J. Gastroenterol.* 10(7):695-698; 1975.

The ability of diphenoxylate to control diarrhea caused by ulcerative colitis was studied in 20 patients. In a double-blind, cross-over study, the patients received 5 mg of diphenoxylate three times daily for 14 days and placebo. The treatment sequence was randomized. The test variable for the ability of diphenoxylate to control diarrhea was the mean number of defecations per day. The criterion for inclusion of patients was the presence of four or more daily bowel movements; two patients did not complete the investigation. There was a significant difference ($p<0.01$) in the constipating effect between diphenoxylate and placebo; the average number of bowel movements was reduced by 0.7 per day during a 12-day trial and by 1.3 per day during a 6-day trial. Side effects were seen in 11 patients, 9 during treatment with diphenoxylate, 1 during treatment with diphenoxylate as well as placebo, and 1 during treatment with placebo alone. The side effects included drowsiness, pain, nausea, fatigue, dryness in the mouth, dizziness, headache, and itching. On the basis of the small reduction of defecation frequency and the incidence of side effects, diphenoxylate has no place in the routine treatment of ulcerative colitis.

4293 DELAYED-TYPE ALLERGY IN PATIENTS WITH ULCERATIVE COLITIS. II. ALLERGIC SKIN REACTIONS TO AUTOLOGOUS LEUKOCYTES AND THEIR EXTRACTS. (Eng.) Orlowska, J.; Tomecki, R. (Med. Center Postgraduate Education, Warsaw, Poland). *Mater. Med. Pol.* 7(3):204-209; 1975.

The allergic skin reactions to autologous leukocytes and their extracts were examined in 36 patients with ulcerative colitis. Tests were performed on 24 patients in complete remission and on 12 patients in moderate relapse. Leukocytes were isolated from peripheral blood, and a suspension of autologous leukocytes (0.2 ml) and the extract (0.2 ml) were injected intracutaneously on one forearm. At the same time, on the other forearm, injections of the patient's erythrocytes, autologous serum, and dextran were given. Results were considered positive for an allergic reaction if there was infiltration of the subcutaneous tissue, with or without reddening and with a diameter of 6 mm or more. Specimens were taken from sites of positive reactions. In 29 patients, there was a positive reaction in the form of infiltration at the site of leukocyte injection. There was erythema in some patients. No exudate or necrosis was observed. The reaction intensity peaked at 48-72 hr. An identical

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reaction occurred from the leukocytes extract in 28 patients. All 36 patients were positive to at least one, if not both, of the leukocytes and their extract. There were no reactions to control substances (erythrocytes, serum dextran). The macroscopic and histologic features of these reactions indicate that they are of cellular type.

4294 LIMITED FORM OF WEGENER'S GRANULOMATOSIS IN ULCERATIVE COLITIS. (Eng.) Kedziora, J. A.; Wolff, M.; Chang, J. (St. Vincent's Hosp., New York, NY). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 125(1):127-133; 1975.

The limited form of Wegener's granulomatosis is described as a complication in two cases of chronic ulcerative colitis. The microscopic changes in these cases were similar. A chronic pleuritis and organizing pneumonitis of nonspecific type were noted in each case. There were areas of parenchymal necrosis, either sizable or smaller (not defined), with a multifocal distribution and with serpiginous borders. Elongated histiocytes aligned in a palisading pattern were found at the edge of the necrotic zones. Smaller arteries and veins frequently demonstrated a mural infiltration by round cells, focal areas of fibrinoid necrosis, and sectoral loss of elastic lamellae. Some of the involved vessels also showed noncaseating granulomata composed of epithelioid cells and Langhans' type giant cells. Similar granulomata were found, unassociated with vessels or necrotic foci. In one of the cases, a single granuloma was noted in the pleura, immediately adjacent to the lung parenchyma; neither vasculitis nor necrosis was seen in the pleura. Fair numbers of eosinophils within the pneumonitic areas were also seen, but none was found occupying vessel walls or granulomata. The other case showed rare eosinophils in two vein walls. Special stains for acid-fast bacilli and fungi were negative in both cases. The pathologic diagnosis was a limited form of Wegener's granulomatosis. The coexistence of ulcerative colitis and the limited form of Wegener's granulomatosis raises the question of a common etiologic basis, possibly of an immunologic defect. Awareness of such an association may shed further light on the etiology of both disorders.

4295 DYSFUNCTION OF THE PANCREAS IN UNSPECIFIC ULCERATIVE COLITIS. (Rus.) Shakhbazian, A. A. (Erevan Medical Inst., Erevan, USSR). *Vrach. Delo* (11):61-62; 1975.

4296 ULCERATIVE COLITIS DIAGNOSED IN THE COURSE OF ROUTINE INVESTIGATION OF PATIENTS WITH RECTOCOLIC DISEASE. (Ita.) Familiari, G.; Mannina, F. (Ospedale Fatebenefratelli-Fatebenesorelle Ciceri-Agnesi, Milan, Italy). *Chir. Gastroenterol.* 9(2):189-195; 1975.

4297 TOXIC MEGACOLON IN ULCERATIVE COLITIS. (Pol.) Dabrowska, M. (Instytut Radiologii AM, ul. Chalubinskiego 5, 02-004 Warsaw, Poland). *Pol. Przegl. Rad. Med. Nukl.* 39(4):483-488; 1975.

See also, 3999, 4190, 4249, 4541, 4576, 4579, 4584.

PANCREAS

4298 EFFECT OF DIAZEPAM AND HYOSCINE BUTYLBROMIDE ON RESPONSE TO SECRETIN AND CHOLECYSTOKININ-PANCREOZYMIN IN MAN. (Eng.) Saunders, J. H. B.; Masoero, G.; Wormsley, K. G. (Dept. Therapeutics, Univ. Dundee, Dundee DD2 1UB, U.K.). *Gut* 17(5):351-353; 1976.

The effects of diazepam and hyoscine butylbromide on the pancreatic and biliary responses to parenteral secretin plus cholecystokinin were investigated in 10 patients undergoing studies for suspected pancreatic diseases. Secretin (1 clinical U/kg/hr) and cholecystokinin-pancreozymin (1 Ivy U/kg/hr) were administered for 45 min by continuous i.v. infusion in NaCl solution (0.15 M). On a different day, five subjects received 10 mg of diazepam, while the other five received 10 mg of diazepam plus 20 mg of hyoscine butylbromide, i.v., immediately preceding the hormone infusion. Diazepam alone did not significantly alter the total bicarbonate, trypsin, or bilirubin outputs in response to the hormones. The addition of hyoscine butylbromide did not significantly affect bicarbonate output, but the outputs of trypsin decreased in every subject. There was a significant delay in attaining peak rates of secretion of trypsin and of bilirubin compared with control after the injection of diazepam plus hyoscine butylbromide during both the first 15 and 30 min after the beginning of the infusion of the exogenous hormones. The use of these drugs during endoscopic cannulation of the pancreas will not significantly affect the measurement of pancreatic secretory capacity, provided that the collection is carried out for a sufficiently long period to compensate for a lag in the secretory response.

4299 STUDIES IN MECONIUM: DISACCHARIDASE ACTIVITIES IN MECONIUM FROM CYSTIC FIBROSIS PATIENTS AND CONTROLS. (Eng.) Antonowicz, I.; Ishida, S.; Shwachman, H. (Children's Hosp. Medical Center, 300 Longwood Ave., Boston, MA 02115). *Pediatrics* 56(5, part 1):782-787; 1975.

ne enzymatic activity of disaccharidases (lactase,
ucrase, maltase, and palatinase) in meconium from
l healthy children and from 17 patients with cystic
ibrosis was investigated. Meconium with a positive
rotein test was presumed to come from a cystic
ibrosis infant and, in each case, the diagnosis was
onfirmed by a positive sweat test performed with
ne pilocarpine inotophoresis quantitative tech-
ique. All results were significant at $p<0.001$ for
isaccharidase activity and total protein. The total
roteins were significantly higher in meconium from
abies with cystic fibrosis than in meconium from
ealthy infants (139-601.5 mg/g meconium for cystic
ibrosis infants; 56-164.3 mg/g meconium for control
nfants). No activity of lactase, with one minor
xception, and palatinase could be detected in
econium from healthy infants, while the specific
ctivities of these enzymes in meconium from infants
ith cystic fibrosis were 13.1 μmol and 8.9 μmol/g
f protein/min, resp. The specific activity of
ucrase was 18 times higher and that of maltase,
.8 times higher in meconium from infants with cys-
ic fibrosis than in healthy infants. These studies
learly demonstrate a dramatic difference in the
isaccharidase activities of meconium from patients
ith cystic fibrosis in comparison to that from
ontrol subjects.

300 EFFECT OF INTRADUODENAL MAGNESIUM SULPHATE ON PANCREAS AND GALLBLADDER OF MAN. (Eng.)

aunders, J. H. B.; Thjodleifsson, B.; Wormsley,
. G. (Dept. Therapeutics, Univ. Dundee, Dundee
D2 1UB, Scotland). *Gut* 17(5):435-438; 1976.

o validate the use of magnesium sulphate as a
urgative in a test involving the measurement of
ecal pancreatic enzyme excretion, the pancreatic
nd biliary responses to an i.v. infusion of secretin
[1 clinical unit (CU)/kg/hr] plus cholecystokinin-
ancreozymin (CCK, 1 IU/kg/hr) in 18 patients were
ompared with the responses to one of three dose-
ates of magnesium sulphate infused into the duo-
enum. The effect of magnesium sulphate was also
studied during the coincident i.v. administration of
the hormones. $MgSO_4$ did not stimulate the secretion
of bicarbonate, and the mean bicarbonate output in
response to the exogenous hormones was not signifi-
cantly affected by any dose of $MgSO_4$ (40, 160, or
640 mM). At these doses, $MgSO_4$ evoked increasing
pancreatic secretion of enzymes. The response to
the infusion of 160 mM was significantly greater
($p<0.02$) than that of 40 mM; the output during the
infusion of 640 mM was greater than the response to
160 mM, but not statistically significant. In
response to the $MgSO_4$ infusion, the secretion of
bile pigment into the duodenum increased, both in
absolute terms and compared with the response to
exogenous hormones. The increase was significant
on increasing the dose rate from 40 to 160 mM
($p<0.05$). There was a statistically significant
increase in the cholecystokinetic response to the
exogenous hormones with 160 mM $MgSO_4$ ($p<0.05$). It
is concluded that the stimulant effect of $MgSO_4$ on
the pancreatic secretion of enzymes, together with
the absence of any interference with the pancreatic
response to exogenous stimulant hormones, makes $MgSO_4$ a satisfactory purgative for use in speeding the intestinal transit of pancreatic enzymes.

4301 PANCREATIC ASCITES: DIAGNOSTIC IMPORTANCE OF ASCITIC LIPASE. (Eng.)

Sileo, A. V.; Chawla, S. K.; LoPresti, P. A. (Catholic Medical Center of Brooklyn and Queens, Inc., Jamaica, NY). *Am. J. Dig. Dis.* 20(12):1110-1114; 1975.

Ten cases of pancreatic ascites are summarized, and special reference is made to conservative management and to the diagnostic value of ascitic lipase fluid determination. Nine patients were heavy alcohol drinkers. All patients presented with increasing abdominal girth associated with either diffuse abdominal discomfort or varying degrees of pain. Significant weight loss was a major symptom in five patients. Vomiting was a prominent symptom in four patients. There were significant degrees of ascites in all patients (mild, moderate, and severe). No patient demonstrated any stigmata of chronic liver disease. The diagnosis of pancreatic ascites was based on a marked elevation of ascitic fluid amylase (752-14,200 Somogyi-U), lipase (2.1-33.0 Cherry-Crandall U), and protein (3.2-15.4 g/100 ml). Serum amylase ranged between 150 and 3,000 Somogyi-U, and serum lipase was between 0.4 and 5.4 Cherry-Crandall U. In one case, serial ascitic fluid enzyme determinations revealed wide fluctuations in amylase levels, while the lipase remained elevated within a narrow range, suggesting that ascitic fluid lipase levels may be a more reliable diagnostic indicator of pancreatic ascites. At surgery, five cases showed evidence of subacute pancreatitis, and four cases had an associated pseudocyst of the pancreas. Conservative management, consisting of abdominal paracentesis with or without diuretics, resulted in complete recovery with no recurrence of symptoms or ascites in three cases.

4302 ISLET CELL CARCINOMA, PANCREATIC CHOLERA, AND VASOACTIVE INTESTINAL PEPTIDE. (Eng.)

Graham, D. Y.; Johnson, C. D.; Bentlif, P. S.; Kelsey, J. R. (Baylor Coll. Medicine, Texas Medical Center, Houston, TX 77025). *Ann. Intern. Med.* 83(6):782-785; 1975.

Three case reports are presented of patients with pancreatic cholera in whom raised blood or tissue vasoactive intestinal peptide (VIP) levels were present. The patients all exhibited profuse watery diarrhea, a nonbeta islet cell tumor, and the absence of gastric hypersecretion. Two patients, a 63-yr-old man and a 52-yr-old man, experienced prolonged remissions of diarrhea after tumor biopsy and after prednisone therapy. Fasting serum VIP levels ranged between 1,200 and 2,000 pg/ml in the first patient, with a level of 400,000 pg/g wet weight in the tumor biopsy. The first patient had elevated VIP levels persisting over several years. In the second patient, the fasting serum VIP level in the tumor biopsy was 1,500,000 pg/g and 600 pg/ml in a fasting plasma sample (normal controls<200). The third patient, a 42-yr-old woman, had elevated levels of both serum gastrin (655 pg/ml) and VIP

(2,700-4,100 pg/ml). It is unlikely that this patient's diarrhea was secondary to the Zollinger-Ellison syndrome, because of the absence of gastric hypersecretion. These cases further implicate VIP as the agent mediating the diarrhea in the pancreatic cholera syndrome.

4303 SIGNIFICANCE OF SERUM AMYLASE LEVEL IN EVALUATING PANCREATIC TRAUMA. (Eng.) Moretz, J. A., III; Campbell, D. P.; Parker, D. E.; Williams, G. R. (Univ. Oklahoma Health Sciences Center, Oklahoma City, OK). *Am. J. Surg.* 130(6): 739-741; 1975.

Attempts were made to correlate preoperative serum amylase levels in 51 patients who underwent exploratory laparotomy for blunt abdominal trauma with pancreatic injury. No statistically significant correlation was found between elevated serum amylase and pancreatic injury. The accuracy of the test improved somewhat with markedly abnormal serum amylase levels (>300 Somogyi U/100 ml), but even at these levels the correlation was not significant. It is concluded that there is no correlation between elevated serum amylase and pancreatic injury in blunt abdominal trauma. Decisions as to the advisability of operation in patients with such trauma should be based on other parameters.

4304 CARCINOMA OF THE PANCREAS: PATHOLOGIC ANATOMY. (Ger.) Becker, V. (Pathol. Inst. d. Universitat, D-8520 Erlangen, Krankenhausstr. 8-10, W. Germany). *Langenbecks Arch. Chir.* 339:219-227; 1975.

4305 PRESERVATION OF THE SPLEEN IN RESECTION OF THE LEFT HALF OF THE PANCREAS. (Rus.) Apakova, S. A.; Shekhtel', R. V. (Leningrad Inst. Hygiene and Medicine, Leningrad, USSR). *Vestn. Khir.* 115(8):32-35; 1975.

4306 LOCAL HYPOTHERMIA OF THE STOMACH IN THE TREATMENT OF PANCREATIC FISTULAS. (Rus.) Beliaev, A. A.; Shindiaikin, A. N. (N. V. Sklifosovskii Scientific Research Inst. First Aid, Moscow, USSR). *Khirurgiia (Mosk.)* (7):48-51; 1975.

4307 PREOPERATIVE DIAGNOSIS OF CARCINOMA OF THE AMPULLA OF VATER. (Bul.) Khadzhidekov, G.; Pomakov, P.; Kolev, K. (Faculty Medicine, Medical Acad., Sofia, Bulgaria). *Suvrem. Med.* 26(6): 11-15; 1975.

4308 HEMORRHAGE IN CANCER OF THE PANCREAS. (Rus.) Andreitsev, A. N.; Volodin, N. P. (Moscow Medical Inst. Stomatology, Moscow, USSR). *Klin. Med. (Mosk.)* 53(6):49-51; 1975.

4309 RADIOLOGICAL DIAGNOSIS IN THE PANCREAS. (Ger.) Anacker, H. (Institut fur Roentgendiagnostik, Technische Univeristiat, 8 Munich 80, Ismaninger Strasse 22, W. Germany). *Med. Klin.* 70(21):915-925; 1975.

4310 FUNCTIONAL DIAGNOSIS OF EXOCRINE PANCREAS. (Ger.) Schmidt, H.; Lankisch, P. G. (Kliniken der Landeshauptstadt, 62 Wiesbaden, Schwalbacher Strasse 62, W. Germany). *Med. Klin.* 70(30):1227-1236; 1975.

4311 EXTERNAL SECRETORY FUNCTION OF THE PANCREAS IN CHILDREN AGED UNDER ONE YEAR. (Rus.) Khar'kova, R. M. (Moscow Scientific Res. Inst. Pediatrics and Pediatric Surgery, Russian SSR Ministry Health, Moscow, USSR). *Vopr. Okhr. Materin. Det.* 20(12):14-18; 1975.

See also, 3978, 3980, 3997, 4003, 4007, 4011, 4023, 4030, 4035, 4037, 4038, 4090, 4094, 4134, 4222, 4228, 4251, 4295, 4312, 4322, 4385, 4480, 4509.

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PANCREAS

Pancreatitis

4312 PROSPECTIVE STUDY FOR THE PREVENTION OF PANCREATITIS FOLLOWING ENDOSCOPIC RETROGRADE CHOLANGIO-PANCREATOGRAPHY (ERCP). (Eng.) Koch, H.; Belohlavek, D.; Schaffner, O.; Tympner, F.; Rosch, W.; Demling, L. (Med. Univ.-Klinik, 852 Erlangen, Krankenhausstr. 12, W. Germany). *Endoscopy* 7(4):221-224; 1975.

Studies were undertaken to determine whether the administration of aprotinin or glucagon in addition to antibiotics would further decrease the number of patients developing pancreatitis following endoscopic retrograde cholangiopancreatography (ERCP). Fifty patients (group 1) were given tetracycline (1.5 g/day, p.o.) 2 days before ERCP, on the day of the examination, and 2 days after ERCP. Another 50 patients (group 2) were given the same treatment plus 500,000 U of aprotinin per infusion at the beginning of, and

1 hr after, ERCP. The third group (50 patients) received tetracycline plus 1 mg of glucagon per i.v. infusion immediately before cannulation, and 5 mg of glucagon per infusion starting 1 hr after ERCP and for the following 5 hr. All groups were seen to have an increase in leukocytes after 6 hr, which was statistically significant in the first and third groups ($p<0.01$ and $p<0.001$, resp.). Serum amylase increased significantly ($p<0.01$) after 6 hr in the third group. Lipase values increased significantly in all three groups after 1 hr; the increase in the second and third group, however, was more significant ($p<0.005$ and $p<0.01$, resp.) than in the first group. The third group had a significantly higher leukocyte rate ($p<0.001$) than the other two groups; there were no other significant differences between the groups. The incidence of pancreatitis in these 150 patients decreased to 1.7%, compared to an incidence of 13.5% after parenchymography of the pancreas reported in an earlier study and 5.1% after retrograde pancreatography without parenchyma visualization. The results suggest that neither glucagon nor aprotinin yields better prophylaxis against pancreatitis than the administration of antibiotics alone.

4313 PANCREATITIS AND THE PILL. (Eng.) Mungall, I. P. F.; Hague, R. V. (Royal Hosp., West St., Sheffield S1 3SR, U.K.). *Postgrad. Med. J.* 51(602):855-857; 1975.

The case of a 34-yr-old woman with acute pancreatitis who had been on a combined contraceptive pill (ethinyloestradiol and megestrol acetate) for 4 yr is presented. The patient experienced vomiting, recurrent upper abdominal pain, and chest pain. She had circulatory collapse, profound hypoxia, hypocalcemia (7.6 mg/100 ml), electrocardiogram changes ("T" wave inversion over the left standard and chest leads), and intravascular consumption coagulopathy complicating acute pancreatitis. Hyperlipidemia had previously been suggested as an etiological factor in cases of acute pancreatitis in women on the pill. However the lipid levels in this patient were normal. The authors recommend that acute pancreatitis be considered in any patient on the pill who develops abdominal pain, regardless of the serum lipid levels.

4314 EVALUATION OF THE GASTROCOLIC SPACE IN 100 CASES OF ACUTE PANCREATITIS. (Eng.) Moreno, G.; Rivera, H. H. (General Hosp. Mexico, SSA, Hershell 152 Anzures, Mexico 5, DF, Mexico). *Radiology* 118(3):535-538; 1976.

In 100 cases of acute pancreatitis, complete radiological studies of the chest and plain films of the abdomen were available, permitting an evaluation of the frequency of the radiological signs of this disease. Gastrocolic separation on the plain, supine, or upright film of the abdomen, observed with a nasogastric tube or with the aid of a barium swallow, was seen in 49 cases. This was usually found in obese patients with excess fat in the greater omentum. The colon cut-off sign was seen in 23 patients, and the sentinel loop in 21. Upward, forward, or downward displacement of the stomach, observed with a nasogastric tube or with the aid of barium, was seen in 22 patients, and generalized peritoneal reaction, observed in supine and upright plain films of the abdomen, was seen in 27 cases. Gastrocolic separation and colon cut-off were observed together in eight cases. Because of the high incidence of the gastrocolic space in acute pancreatitis, plain films are a useful aid in the diagnosis of this disease.

4315 SECRETIN DOSE-RESPONSE IN HEALTH AND CHRONIC PANCREATIC INFLAMMATORY DISEASE. (Eng.) Petersen, H.; Myren, J. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 10(8):851-861; 1975.

Proteolytic enzyme, bilirubin, and enzyme responses to secretin were studied in 12 healthy volunteers (HV), in 12 patients with a history of chronic pancreatic inflammatory disease of more than 5 yr (CP5), and in 9 patients with a history of 2 yr or less (CP2). Stepwise increasing doses of secretin (0.078, 0.233, 0.7, and 2.1 U/kg/hr) were administered to all subjects by gastroduodenal tube. The maximal bicarbonate response (Vmax) and the half maximal dose of secretin (Km) were calculated for each individual. Bicarbonate responses below that in HV were found in 10 of the CP5 and in 3 of the CP2. Vmax showed no superiority to the responses to the three largest doses of secretin in the diagnosis of bicarbonate secretory deficiency. In CP2, bicarbonate responses above that in HV were frequently found with the small doses of secretin. No evidence of hypersecretion was found. The findings suggest that the early stage of chronic pancreatic inflammatory disease may be associated with an increased sensitivity to secretin. Km was poorly reproducible and showed no diagnostic ability. Large doses of secretin stimulated the secretion of proteolytic enzymes, but the diagnostic efficiency was less than that for bicarbonate. The output of calcium varied markedly in CP2 and CP5. The bicarbonate/calcium ratio, however, was almost invariably lowered in these patients and showed diagnostic superiority to bicarbonate secretion. The findings suggest that more attention should be paid to calcium secretion in pancreatic function tests.

4316 MODERN THERAPEUTIC, PROGNOSTIC AND GERIATRIC ASPECTS OF CHRONIC PANCREATITIS. (Ger.) Dietze, F.; Schulz, H.-J.; Kalbe, I. (I. Med. Klin. des Bereiches Medizin (Charite), Humboldt-Universitat, Schumannstr. 20/21, 104 Berlin, E. Germany). *Z. Alternsforsch.* 29(4):355-360; 1975.

4317 VASCULAR GENESIS OF CHRONIC PANCREATITIS. (Ger.) Ammann, R. (Departement fur Innere Medizin der Universitat, Kantonsspital, CH-8091 Zurich, Ramistr. 100, Switzerland). *Dtsch. Med. Wochenschr.* 101(22):867-868; 1976.

4318 ALTERATIONS OF THE COLON IN THE COURSE OF EVOLUTIVE ATTACKS OF CHRONIC PANCREATITIS. (Fre.) Paris, J.; Gerard, A.; Quandalle, P.;

Vankemmel, M.; Catry, C. (No affiliation given). *Lille Med.* 20(9):802-805; 1975.

4319 CIRCULATING BLOOD DISTRIBUTION IN ACUTE PANCREATITIS AND CHOLECYSTOPANCREATITIS. (Rus.) Nechiporuk, V. M.; Zarudniak, V. M. (Vinnitsa Medical Inst., Vinnitsa, USSR). *Vrach. Delo* (3):82-86; 1976.

4320 EFFECTIVENESS OF CERTAIN TYPES OF NOVOCAINE BLOCKADES IN ACUTE AND CHRONIC PANCREATITIS. (Rus.) Zhandarov, N. I.; Tishkovskaia, O. F. (Grodno Medical Inst., Grodno, USSR). *Klin. Khir.* (4):34-36; 1976.

4321 THERAPY OF CHRONIC PANCREATITIS. (Ita.) Schoenemann, J.; Doelle, W. (Medizinische Universitatsklinik, Otfried-Muller-Strasse, D-74 Tubingen, W. Germany). *Clin. Ter.* 75(1):3-12; 1975.

4322 SIGNIFICANCE OF ANGIOGRAPHY OF THE PANCREAS IN THE DIAGNOSIS OF CHRONIC PANCREATITIS. (Rus.) Orlov, V. A.; Savchenko, A. P. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Klin. Med. (Mosk.)* 53(11):65-69; 1975.

4323 IMMEDIATE AND LONG-TERM RESULTS OF DIRECT SURGICAL INTERVENTION IN CHRONIC PANCREATITIS. PERSONAL EXPERIENCE. (Ita.) Carboni, M.; Patrassi, N.; Negro, P.; de Bernardinis, G.; Loriga, P.; Pistoia, M. A.; Tuscano, D. (Clinica Chirurgica II, Universita di Roma, Rome, Italy). *Chir. Gastroenterol.* 9(2):220-224; 1975.

4324 PARANEPHRIC TRIMECAINE BLOCK IN PATIENTS WITH ACUTE AND CHRONIC PANCREATITIS. (Rus.) Sharov, N. A. (Smolensk Medical Inst., Smolensk, USSR). *Sov. Med.* (11):64-67; 1975.

See also, 4012, 4038, 4091.

LIBRARY U. [illegible]

LIVER AND BILIARY TRACT

4325 THE RADIOLUCENT LIVER. (Eng.) Melhem, R. E. (American Univ. Medical Center, Beirut, Lebanon). *Pediatr. Radiol.* 4(3):153-156; 1976.

Five cases in which a diagnosis of fatty liver was made on the basis of an increased liver radiolucency on the plain film of the abdomen are reported. Two subjects had Reye's syndrome, one had glycogen storage disease, one had severe malnutrition, and one had severe hepatitis (probably viral). The age of the patients ranged from 3 to 8 months old. In one patient, the lateral border of the right kidney could be easily seen on the plain film. The radiolucent liver was more striking on the early films of the intravenous pyelogram in two patients. The radiological diagnosis was later confirmed by histopathologic examination in all patients. Increased liver radiolucency should be specifically looked for whenever severe hepatitis, toxins, severe malnutrition, Reye's syndrome, glycogen storage disease (especially type I), or cystic fibrosis are suspected clinically.

4326 LAPAROSCOPY AND PUNCTURE BIOPSY IN CHRONIC DIFFUSE INFLAMMATORY DISEASES OF THE LIVER. (Rus.) Mukhin, A. S.; Lebedev, S. P.; Severov, M. V. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (7):110-113; 1975.

The diagnostic value of laparoscopy and blind needle biopsy of the liver was studied in 100 cases of diffuse inflammatory hepatopathies. Full agreement was observed between the two techniques in 8 of 11 cases of normal laparoscopic picture, in 7 of 12 cases of fatty liver, in 3 of 3 cases of acute alcoholic hepatitis, in 13 of 20 cases of chronic hepatitis, and in 25 of 50 cases of liver cirrhosis. There was no agreement in four cases of cicatricial liver changes. The bioptic diagnosis was correct only in 52 of 100 cases. Active liver cirrhosis was demonstrated by biopsy in 19 of 20 cases of laparoscopically established active cirrhosis, and inactive cirrhosis in 23 of 30 laparoscopically diagnosed inactive cirrhosis. The biopsy sample was not evaluable in 20% of the cases. Correct diagnosis of the liver cirrhosis was possible in 80% of the cases by the combination of laparoscopy and biopsy. The findings indicate the high reliability of laparoscopic diagnosis in cicatricial liver, liver cirrhosis, and possibly in hepatic tumors and metastases, as well as in the evaluation of the activity of the hepatic process and of portal hypertension. Blind biopsy is indicated after laparoscopy for the follow-up of the activity of the hepatopathy. Laparoscopy should be combined ith biopsy in the diagnosis of diffuse hepatopathies, specially of chronic hepatitis, cirrhosis, and icatricial alterations.

327 HEMOBILIA COMPLICATING NEEDLE LIVER BIOPSY: A CASE REPORT WITH ARTERIOGRAPHIC DEMONTRATION.

(Eng.) Attiyeh, F. F.; McSweeney, J.; ortner, J. G. (Memorial Sloan-Kettering Cancer enter, 1275 York Ave., New York, NY 10021). *adiology* 118(3):559-560; 1976.

he case of a 16-yr-old boy with Hodgkin's disease ho developed massive hemobilia secondary to a eedle liver biopsy is reported. Six days after the rocedure, the patient experienced colicky epigastric nd right upper quadrant pain that radiated to the ack, icterus, hematemesis, and melena. Cholecystectomy and common bile duct drainage failed to control the hemobilia, which had been discovered at laparotomy. Selective angiography revealed an arteriobiliary fistula from a branch of the left hepatic artery. The right hepatic artery branched from the superior mesenteric artery. The left hepatic artery was ligated distal to the junction of the gastroduodenal artery, ending the hemobilia. It is concluded that hepatic artery ligation should be utilized in the treatment of this type of complication of needle biopsy; procedures such as suturing of the needle entry site or T-tube decompression may not be as effective, since they leave the patient in jeopardy of potentially fatal recurrent hemorrhages and the risks of further surgery.

4328 THE RELATIONSHIPS BETWEEN LIVER VOLUME AND THE DISPOSITION OF ANTIPYRINE AND INDOCYANINE GREEN BEFORE AND AFTER PHENOBARBITONE TREATMENT.

(Eng.) Branch, R. A.; Halliwell, M.; Jackson, L.; Roberts, C. J. C. (Dept. Medicine and Pharmacology, Univ. Bristol, Bristol BS8 ITD, U.K.). *Br. J. Pharmacol.* 55(2):263P; 1975.

The effect of p.o. administration of phenobarbitone (180 mg/day for three weeks) on liver volume and clearances of antipyrine and indocyanine green was investigated in 10 normal subjects. The antipyrine clearance of nine subjects correlated with liver volume ($r=0.69$, $p<0.05$), and the remaining subject had maximal induction of antipyrine at the beginning of the experiment. The initial clearances of indocyanine green of seven subjects approximated the expected liver blood flow and related to liver volume; the indocyanine green clearance in the other three subjects was lower than predicted by this relation. After phenobarbitone administration, there was no increase in liver volume. The clearance of antipyrine increased by 90 ± 14.1% ($p<0.001$). There was still a correlation between antipyrine clearance and liver volume ($r=0.86$, $p<0.01$), and there was no significant increase in indocyanine green clearance. It is suggested that in the absence of enzyme induction, variation in drug elimination is related to the total functional hepatic mass, and that phenobarbitone is able to increase the drug metabolizing capacity per unit of mass without causing an increase in total liver size.

4329 STIMULATION OF TRIACYLGLYCEROL SYNTHESIS BY Z PROTEIN IN RAT LIVER AND INTESTINAL MUCOSA.

(Eng.) O'Doherty, P. J. A.; Kuksis, A. (Dept. Biochemistry, Univ. Wisconsin, Madison, WI 53706). *FEBS Lett.* 60(2):256-258; 1975.

The role of the Z protein in the acylation of diacylglycerols to triacylglycerols was studied in microsomes of rat liver and intestinal mucosa. The addition of increasing amounts of Z protein (10-30 nmol) to the microsomes resulted in a 15-fold stimulation of triacylglycerol biosynthesis as measured by the incorporation of [1-^{14}C]palmitoyl coenzyme A (CoA) into triacylglycerols by the microsomes. With 30 nmol of Z protein, the incorporation of [1-^{14}C]palmitoyl CoA was 0.80 nmol/2 mg protein. With the addition of 10 mg of the 105,000 x *g* cytosol, the incorporation was 0.16 nmol/2 mg microsomal protein; with 20 mg of the cytosol, 0.35 nmol/2 mg; and with no addition, 0.05 nmol/2 mg. The addition of 20 or 40 nmol of albumin did not duplicate the action of the Z protein, suggesting that the stimulatory action is due to the Z protein and not to albumin, which is present in trace amounts in the cytosol. The addition of Z protein to intestinal microsomes in the same doses resulted in increases similar to those occurring in the liver microsomes (0.15-0.38 nmol/2 mg microsomal protein compared to 0.04 nmol in controls). The results suggest that the Z protein may be involved in the acylation of diacylglycerols to triacylglycerols in the microsomes of rat liver and intestinal mucosa.

4330 ANALYSIS OF HEPATIC-VENOUS ^{133}XENON CLEARANCE AFTER ADMINISTRATION OF THE GAS BY INHALATION.

(Ger.) Dietze, G.; Wicklmayr, M.; Czempiel, H.; Henftling, H. G.; Hepp, K. D.; Mehnert, H. (III Med. Abteilung, Stadt. Krankenhaus, Schwabing, D-8000 Munchen 40, Kolner Platz 1, Germany). *Klin. Wochenschr.* 53(13):639-640; 1975.

To determine the usefulness of hepatic-venous ^{133}Xe clearance for the calculation of hepatic blood flow, ^{133}Xe was measured at 10-sec intervals for 10 min in blood samples from the hepatic and portal veins of 12 normal subjects after they inhaled the gas. Clearance curves were plotted on a semilogarithmic scale. In contrast to findings obtained when ^{133}Xe was injected into the portal vein, a short multi-exponential component was obtained initially instead of a rapid component, and a mono-exponential terminal component F1 with a relatively large "wash out" constant K1, 0.22 ± 0.3/min, was obtained instead of a negligible terminal component. Arterial recirculation in the liver became negligible rapidly, suggesting that the mono-exponential terminal component F1 of the hepatic-venous clearance results from ^{133}Xe that has recirculated from the gastrointestinal tract. This was demonstrated by the mono-exponential decrease that occurred in the portal ^{133}Xe concentration; the time constant for this component, 0.34 ± 0.03/min, was not significantly higher than that for F1. Extrapolation of the terminal component F1 of hepatic-venous clearance of ^{133}Xe to the beginning of desaturation and subtraction from the multi-exponential initial component resulted in a mono-exponential component F2 with a mean wash out constant K2 of 1.24 ± 0.1/min. A hepatic blood flow of 91.8 ± 7.4 ml/100 g/min was calculated by using K2 and the formulas derived from Kety's principle, assuming that the distribution coefficient for the normal liver is 0.74. Further studies are necessary to determine the validity of the hepatic blood flow calculated by this simple graphic method, and to determine whether it is possible to obtain the same values with a scintillation detector applied externally rather than removing blood samples through catheters to measure the ^{133}Xe clearance.

4331 HYPERPARATHYROIDISM IN HEPATOBILIARY DISEASE IN INFANCY. (Eng.) Kobayashi, A.; Kawai, S.; Utsunomiya, T.; Ohbe, Y. (Natl. Children's Hosp., Taishido 3-35-31, Setagaya-ku, Tokyo 154, Japan). *Eur. J. Pediatr.* 121(1):5-13; 1975.

The tubular reabsorption of phosphate (TRP), calcium (TRCa), and magnesium (TRMg) were determined in 55 children (aged 2-45 months) with hepatobiliary disease to evaluate parathyroid function in this type of disease. In 33 cases of unrepaired biliary atresia, TRP was conspicuously reduced (mean=49.8%, standard deviation=15.1). In 10 cases of successfully repaired biliary atresia, the value was increased near the normal range (mean=80.7%, S.D.=8.1). In 10 infants with neonatal hepatitis, the value was variable in individual cases, but significantly lower than the normal (mean=47.6%, S.D.=19.9). TRCa was reduced in one-third of the patients with unrepaired biliary atresia and in one-fifth of the cases of neonatal hepatitis. The value was within the normal range in repaired biliary atresia. TRMg was decreased in both unrepaired and repaired biliary atresia and in neonatal hepatitis. The effect of i.v. calcium infusion (4.5 mg/kg/hr, 20 hr) on TRP, TRCa, and TRMg was evaluated in three patients with unrepaired biliary atresia. TRP was conspicuously enhanced after infusion. TRCa was decreased to a variable extent in three patients. TRMg was moderately increased in two children and greatly decreased in one. The results indicate that infants with hepatobiliary disease are in a state of secondary hyperthyroidism because of deficient or absent bile flow into the intestines.

4332 PYOGENIC LIVER ABSCESS SECONDARY TO ASYMPTOMATIC SIGMOID DIVERTICULITIS. (Eng.) Wallack, M. K.; Brown, A. S.; Austrian, R.; Fitts, W. T., Jr. (Univ. Pennsylvania, Philadelphia, PA 19174). *Ann. Surg.* 184(2):241-243; 1976.

The case of a 53-yr-old man with multiple pyogenic liver abscesses secondary to asymptomatic sigmoid diverticulitis is presented. The patient presented with fever, weakness, right-side abdominal pain, and an enlarged tender liver; a liver scan and celiac arteriogram showed spherical defects and areas of hypervascularity. At laparotomy, multiple abscesses containing *Enterobactor aerogenes* and *Pseudomonas aeruginosa* were found throughout the right lobe of the liver, although no obvious primary site of infection was found. There was a mass in the sigmoid colon, but no signs of acute inflammation were found around it. The mass was removed, and microscopic examination revealed diverticula and veins filled with pyogenic material. There was no history of diverticulitis preceding the sudden onset of the liver abscesses. The patient has done well for 2 yr following drainage of the abscesses and resection of the mass in the sigmoid. The authors propose that the liver abscesses came from the occult sigmoid diverticulitis.

4333 ALPHA$_1$-ANTITRYPSIN DEFICIENCY AND LIVER DISEASE IN CHILDREN: PHENOTYPES, MANIFESTATIONS, AND PROGNOSIS. (Eng.) Odievre, M.; Martin, J.-P.; Hadchouel, M.; Alagille, D.; Thaler, M. M. (Unite de recherche d'hepatologie infantile I.N.S.E.R.M. U 56, France). *Pediatrics* 57(2):226-232; 1976.

Clinical and histological findings and follow-up results in children with α_1-antitrypsin deficiency are reported. Among 424 children with liver disease, 20 had α_1-antitrypsin deficiency associated with protease inhibitor ZZ phenotype. The disorder manifested itself as cholestasis in early infancy in 19 children. Jaundice and pruritus cleared in 16 of these by 7 months of age, but hepatomegaly and laboratory evidence of mild hepatic dysfunction persisted in all. Biliary cirrhosis and portal hypertension eventually developed or was suspected in eight children, and hypoplasia of intrahepatic bile ducts was demonstrated in another four. Routine screening revealed intermediate α_1-antitrypsin deficiency in 16 other children with various types of liver disease. The phenotype in these patients was MZ, MS, or SZ. PAS-positive granules were present in liver of all patients with the ZZ phenotype and in none with other phenotypes. The findings indicate that manifestations and prognosis of this inherited liver disease are extremely variable.

4334 BENIGN LIVER CELL ADENOMA ASSOCIATED WITH USE OF ORAL CONTRACEPTIVE AGENTS. (Eng.) Baek, S.-M.; Sloane, C. E.; Futterman, S. C. (Mount Sinai Sch. Medicine, City Univ. New York, Fifth Ave. and 100 St., New York, NY 10029). *Ann. Surg.* 183(3):239-242; 1976.

The case of a 31-yr-old woman who developed a hepatic adenoma and who had been taking oral contraceptives (Ortho Novum 2 mg) for 7 yr is reported. The patient presented with right upper quadrant pain associated with nausea, vomiting, and fever. A well circumscribed, nonencapsulated tumor (18 x 16 x 12 cm) was found in the right lobe of the liver that extended into the pelvis. The tumor was highly vascular with blood vessels on the surface. Following right hepatic lobectomy and cholecystectomy, the patient had an uneventful recovery. The increasing number of reports of benign hepatic adenoma arising in the livers of young women taking oral contraceptives strongly suggests an association between the contraceptives and benign hepatic adenoma.

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335 HEPATIC CHANGES IN YOUNG WOMEN INGESTING CONTRACEPTIVE STEROIDS: HEPATIC HEMOR-HAGE AND PRIMARY HEPATIC TUMORS. (Eng.) Mays, E. .; Christopherson, W. M.; Mahr, M. M.; Williams, H. . (Albert B. Chandler Medical Center, Univ. Ken-ucky, Lexington, KY 40507). *JAMA* 235(7):730-732; 976.

he cases of 13 women (22-47 yr) who developed rimary hepatic tumors after taking oral contracep-ives for 0.5-8 yr are described. The contracep-ives included norethynodrel, norethindrone, ethy-nodiol diacetate, norethindrone, and norgestrel, all ombined with mestranol, and norgestrel plus ethinyl stradiol. Nine tumors were benign. Of the four atients with malignant hepatocellular carcinoma, nly one was alive 2 months after a right lobectomy; n two cases the tumor was nonresectable, and in the ther case, the patient died during resection. The alignant tumors had irregular nests of hepatocytes rowing randomly, without cord organization. The uclei were irregular and hyperchromatic, and venous invasion was evident in these well-differentiated arcinomas. Six tumors (5 focal nodular hyperplas-ias, 1 carcinoma), caused massive hemoperitoneum averaging 2,500 ml in four patients. Eight benign tumors were successfully resected, and the patients were alive 8 months to 6 yr after the resection. A possible link between steroid contraceptives and hepatic tumors was especially likely in the ninth patient with a benign tumor. After taking contracep-tives for 5 yr, the patient required lobectomy for a ruptured tumor; after continuing the use of the drug for a further 6 yr, a similar benign tumor (which was not resected) developed.

4336 HEPATOMA OCCURRING TWO DECADES AFTER HEPATIC IRRADIATION. (Eng.) Moore, T. A.; Ferrante, W. A.; Crowson, T. D. (Ochsner Medical Center, New Orleans, LA 70121). *Gastroenterology* 71(1):128-132; 1976.

A case of hepatocellular carcinoma that occurred two decades after radiotherapy for presumed hepatic hemangioma is presented. At 12 yr, the patient was diagnosed as having hepatic hemangioma and received 1,350 rads of orthovoltage irradiation to the liver by an anterior port for 6 weeks. Seven months later, the patient received 1,200 rads through a right lateral port for 8 days (total dose 2,500 rads). After 19 yr, the patient noticed a right upper abdominal mass. With the exceptions of episodic right upper quadrant pain and mass, the patient was virtually asymptomatic. Abnormal laboratory findings included alkaline phosphatase, SGOT, and BSP retention levels. A colloidal gold liver scan revealed a grossly enlarged liver with hypertrophy of the left lobe and a large area of decreased isotope uptake in the lower two-thirds of the right lobe. At exploratory surgery, a large tumor of the right hepatic lobe and part of the left hepatic lobe was found. The tumor was thought to be resectable, and an extended right hepatectomy with cholecystectomy was performed. Several months later, the patient developed serum hepatitis and had abnormal liver function tests and liver scans. Three yr later, a percutaneous liver biopsy revealed recurrent hepatoma, and 5-fluorouracil therapy (300 mg/day for 10 days, intraperitoneally) was begun. At 1-month follow-up, liver function studies had returned to normal levels, and the hepatic nodules had returned to normal size. Less than 1 yr later, hepatic enlargement again occurred. The patient died 1 yr later, 26 yr after radiation therapy. This may represent the first case of hepatoma associated with therapeutic hepatic radiation, and it emphasizes the long-term effects of radiation on the human liver.

4337 RADIORESPIROMETRIC STUDY OF CARBOHYDRATE METABOLISM IN CHILDHOOD LIVER DISEASE. (Eng.) DaCosta, H.; Shreeve, W. W.; Merchant, S. (Veterans Admin. Hosp., Northport, NY). *J. Nucl. Med.* 17(3):218-219; 1976.

Studies were undertaken to determine whether any abnormalities in the metabolism of ^{14}C-labeled galactose or glucose occurred in 27 children with Indian childhood cirrhosis or in 14 patients with idiopathic infiltration in comparison with 9 controls. Each subject received ^{14}C-1-galactose (0.25 g galactose/kg, p.o.) on the first day and ^{14}C-U-glucose (0.5 g glucose/kg) 2 days later. The exhaled $^{14}CO_2$ was determined. There was a 10-fold increase over normal peak values for ^{14}C-glucose. Galactose catabolism was diminished 30-fold in cirrhotic patients during the initial 4-hr observation period. Children with fatty hepatic infiltration attained normal peak values, albeit after a longer time interval. The marked reduction in oxidation of ^{14}C-galactose to $^{14}CO_2$ in Indian childhood cirrhosis could relate to the marked diminution of blood flow and extensive hepatic fibrosis characteristic of the disease. The results suggest the feasibility of this radiorespirometric technique for monitoring patients with liver disease.

4338 FURTHER CLINICAL STUDIES WITH INTRAHEPATIC ARTERIAL INFUSION WITH 5-FLUOROURACIL. (Eng.) Ansfield, F. J.; Ramirez, G.; Davis, H. L., Jr.; Wirtanen, G. W.; Johnson, R. O.; Bryan, G. T.; Manalo, F. B.; Borden, E. C.; Davis, T. E.; Esmaili, M. (Univ. Wisconsin Medical Sch., Madison, WI). *Cancer* 36(6):2413-2417; 1975.

A clinical study of the treatment of liver metastasis with intrahepatic arterial infusion of 5-fluorouracil (5-FU) was made in 419 patients. Three-fourths of the patients had received 5-FU, i.v., before being switched to the infusion method. In most cases, the metastases were of colorectal primaries. The remaining patients did not receive 5-FU, i.v., because the primary metastasis was not responsive to 5-FU, the metastasis was too far advanced for an i.v. trial, or the liver metastasis was associated with jaundice from parenchymal liver involvement and was too poor a risk for i.v. loading. Toxic reactions included nausea and vomiting (33), diarrhea (62), abdominal pain (23), stomatitis (26), leukopenia (10), and thrombocytopenia (1). Morbidity resulting from intrahepatic artery infusion was caused by catheter displacement (45) catheter cracking or leaking (21), infection at the site of percutaneous catheter entry (16), upper gastrointestinal bleeding (11), and other causes (16). Of the 419 patients, 293 were selected for study. Of these, 161 (55%) improved, with a mean survival of 11.6 months. The mean survival for those unimproved was 5.6 months. The mean survival of those who improved is far greater than double the mean survival of patients not treated with chemotherapy. The authors conclude that arterial infusion of 5-FU remains an important therapeutic consideration until a more effective therapy is developed for patients with liver metastasis, especially of colorectal origin.

4339 HYPERALANINEMIA, HYPERPYRUVICEMIA AND LACTIC ACIDOSIS DUE TO PYRUVATE CARBOXYLASE DEFICIENCY OF THE LIVER; TREATMENT WITH THIAMINE AND LIPOIC ACID. (Eng.) Maesaka, H.; Komiya, K.; Misugi, K.; Tada, K. (Kanagawa Children's Medical Center, Mutsukawa, 2-138-4 Minami-ku, Yokohama, Japan). *Eur. J. Pediatr.* 122(2):159-168; 1976.

The case reports of a 16-month-old female infant with severe mental and motor retardation, clinically diagnosed as Leigh's encephalomyelopathy, and her 2.5-yr-old retarded sister are presented. Laboratory studies of the infant showed elevated serum nonesterified fatty acid (1,170 μEq/l), varying blood glucose level (64-84 mg/dl), a pH of 7.475, pO_2 112 mm Hg, pCO_2 10.8 mm Hg, and a base excess of 14 mEq/l. Cerebrospinal fluid glucose was low (45-53 mg/dl), and there was a significant increase in alanine. Blood lactate and cerebrospinal fluid lactate were 56.4 and 49 mg/dl, resp. Urinary lactate excretion was increased (0.37 versus 0.04 mg/mg creatinine for normals), and pyruvate excretion was increased (0.14; normal, 0.03 mg/mg creatinine). In the older sister, the electromyogram showed complex NMU, suggesting a neurogenic disturbance. Blood lactate was normal, but at age 4, repeated studies revealed that the blood lactate was 32 mg/dl and blood pyruvate was 3.1 mg/dl. These findings suggest an inborn error of metabolism in gluconeogenesis. Both sisters clinically and biochemically showed improvement with treatment of thiamine HeL and lipoic acid. It is concluded that the effect of thiamine and lipoic acid is due to a shunt mechanism for pyruvate disposal via pyruvate dehydrogenase, in which both materials act as cofactors.

4340 EFFECT OF CHENODEOXYCHOLIC ACID ADMINISTRATION ON BILE ACID AND CHOLESTEROL SYNTHESIS IN MAN. (Eng.) Halloran, L. G.; Schwartz, C. C.; Vlahcevic, Z. R.; Gregory, D. H.; Swell, L. (Medical Coll. Virginia, Richmond, VA). *Surg. Forum* 26:439-442; 1975.

The effect of exogenous chenodeoxycholic acid (CDCA) on cholic and CDCA synthesis and on cholesterol and phospholipid secretion was studied in three men undergoing elective, common bile duct surgery for cholesterol choledocholithiasis. Four hr after the start of a 9-hr constant i.v. infusion of DL-[5-^{3}H] mevalonic acid (15 μCi/hr), 300 mg of CDCA with 8 μCi [^{14}C]CDCA was administered via an intraduodenal Silastic catheter. Total bile acid synthesis averaged 2.69 μM/min, and fell to 1.96 μM/min ($p<0.001$) within 2 hr of CDCA administration. Primary bile acid synthesis decreased, averaging 32% for cholic acid and 29% for CDCA. Bile acid synthesis moved toward the baseline by the 14th hr when exogenous [^{14}C]CDCA disappeared from the bile. Biliary cholesterol and phospholipid secretion were not significantly altered by the exogenous CDCA. Within 90 min, there was a marked decrease of ^{3}H in both bile acids, indicating a decrease in the activity of cholesterol 7α-hydroxylase; however, ^{3}H activity increased in both bile acids, suggesting suppression at an additional feedback site, HMG-CoA reductase.

4341 HEPATIC MORPHOLOGY AND BILE ACID COMPOSITION OF BILE AND URINE DURING CHENODEOXYCHOLIC ACID THERAPY FOR RADIOLUCENT GALLSTONES. (Eng.) Pedersen, L.; Bremmelgaard, A. (Medicinsk afdeling I, Aalborg Sygehus, afsnit NORD, 9000 Aalborg, Denmark). *Scand. J. Gastroenterol.* 11(4):385-389; 1976.

The safety of using chenodeoxycholic acid (CDCA) for the treatment of radiolucent gallstones was investigated in nine patients receiving CDCA (500-750 mg/day for 3-14 months). In four patients, pretreatment percutaneous liver biopsy specimens were available for comparison; no sign of hepatic cellular necrosis or bile duct proliferation was seen. In two patients, hepatic steatosis was reduced, and in one patient, moderate portal tract inflammation decreased during therapy. Mean values of alkaline phosphatases, alanine aminotransferases, prothrombin, and serum lipids remained unchanged and did not exceed normal limits. In five patients, the urinary bile acid profile was examined during therapy. CDCA constituted 27-50%, lithocholic acid 25-63%, and ursodeoxycholic acid 0-13% of total bile acids in the urine. The renal excretion of total bile acids was estimated to be less than 2 mg/day in each patient. Between 86 and 100% of the bile acids in the urine were sulfated. These studies indicate that daily doses of 500-750 mg of CDCA do not harm the liver.

4342 STUDIES IN CHOLESTASIS OF PREGNANCY: III. FATTY ACID COMPOSITION OF SERUM PHOSPHOGLYCERIDES. (Eng.) Johnson, P.; Olegard, R.; Samsioe, G.; Gustafson, A. (Sahlgren's Hosp., Univ. Goteborg, Goteborg, Sweden). *Acta Obstet. Gynecol. Scand.* 54(3):241-246, 1975.

The influence of cholestasis of pregnancy (CP) on liver lipid synthesis, reflected by the composition of serum phosphoglycerides, was studied in 28 pregnant women in the last trimester by gas-liquid-chromatography. All patients complained of pruritus and had immunologically detectable lipoprotein-X (LP-X) in their serum. Twenty women with uncomplicated pregnancies served as controls. In lecithin, low palmitic acid (16:0) and high oleic acid (18:1 [n-9]) were found, which appear to be characteristic

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for CP. The increased oleic acid suggests an enhanced liver lecithin synthesis through the cytidinediphosphate diglyceride pathway. The concentrations of lecithin were measured from the gas-liquid-chromatograms using an added internal standard fatty acid, which gave a linear relation to direct determination of lecithin. For further studies of the influences of cholestasis of pregnancy on the relative fatty acid composition, lecithin was chosen because differences between lecithin (phosphatidyl choline) and phosphoglycerides (GPL) were found, evidently due to mutual variations among the three components in GPL (lecithin, cephalin, and lysolecithin).

4343 LP-X IN CHOLESTASIS. (Eng.) Tanno, H.; Fay, O.; Palazzi, J.; Pedrana, R.; Yager, E.; Roncoroni, M. (Unidad de Higado, Sanatorio Parque and Instituto de Estudios Bioquimicos, Orono 860, Rosario, Argentina). *Acta Hepatogastroenterol.* 22(5):289-291; 1975.

The sera of 62 patients with intra- and extrahepatic biliary obstruction of different etiologies were tested for the presence of lipoprotein-X (Lp-X). Lp-X was detected in 19 of 20 patients with cholestasis by tumor obstruction; in 14 of 16 patients with cholestasis by lithiasis, in 5 of 6 patients with cholestatic hepatitis, in 2 of 4 patients with cirrhosis, in 3 patients with benign, recurrent, intrahepatic cholestasis, and in 1 of 2 patients with recurrent jaundice of pregnancy. It was not detected in seven patients with noncholestatic hepatitis or in one patient with the Dubin-Johnson syndrome. Lp-X disappeared in the sera of four patients with large bile duct obstruction due to tumor 2 weeks after the tumors were removed. Although the presence of Lp-X does not help in the differential diagnosis of extra- and intrahepatic biliary obstruction, its presence does help to confirm the existence of cholestasis.

4344 SERUM IMMUNOGLOBULIN LEVELS IN PRIMARY LIVER CANCER: RELATIONSHIP TO UNDERLYING CIRRHOSIS AND HEPATITIS-B (SURFACE) ANTIGENAEMIA. (Eng.) Ipp, T.; Macnab, G. M.; Geddes, E. W.; Kew, M. C. (South African Inst. Medical Res., Johannesburg, South Africa). *Br. J. Cancer* 32(4):509-511; 1975.

Serum immunoglobulin (Ig) IgG, IgM, and IgA levels were measured by the single radial diffusion method in 107 South African patients with primary hepatocellular cancer (PHC) and 112 healthy blood donors. The mean serum IgG and IgM concentrations were significantly higher ($p<0.001$) in the PHC patients. In 20 patients in whom PHC was associated with cirrhosis, the serum IgG level was greater ($p<0.02$) than in those without cirrhosis. However, the mean serum IgG concentration in the non-cirrhotic cancer patients was still significantly higher than the control value ($p<0.001$). Thus, while cirrhosis may contribute to the raised IgG levels in PHC, other factors must also be involved. There was no difference in the serum immunoglobulin concentrations in the 63 PHC patients with hepatitis B antigenemia and in those without antigenemia.

4345 PRIMARY CYTOMEGALOVIRUS INFECTION AND LIVER INVOLVEMENT IN EARLY INFANCY. (Eng.) Chiba, S.; Hori, S.; Kawamura, N.; Nakao, T. (Sapporo Medical Coll., Sapporo, Japan). *Tohoku J. Exp. Med.* 117:143-151; 1975.

Primary cytomegalovirus (CMV) infection and liver involvement in early infancy were investigated in 237 patients under 1 yr of age to clarify the etiologic significance of primary infection with CMV in infancy. Fresh urine and mouth swab specimens were inoculated into tubes of human embryonic lung fibroblasts (HEL). The CMV was identified characteristic cytopathic effect (CPE) and by failure to demonstrate CPE in nonhuman and epithelial cells. SGOT and SGPT tests were carried out simultaneously with virus isolation in 205 and 207 infants, resp. The CMV was isolated from 29 of 87 infants and in 28 of 66 infants with liver involvement. The rates of virus isolation from the infants with normal GOT and GPT values were 14% and 13%, resp. The differences in virus isolation rates between normal and abnormal groups were statistically significant ($p<0.05$). They were more pronounced in infants under 3 months of age, and five to seven times higher in the infants with liver involvement. Tests of SGOT and SGPT were carried out on 250 and 244 infants simultaneously with complement-fixing antibody (CF) determination. There was no significant difference between the group with liver involvement and the control group, although CF antibody against CMV was detected slightly more often in the infants with liver involvement than in those without. The results indicate the significant correlation between virus recovery and liver abnormality, especially in very early infancy. The correlation between CF antibody and liver involvement was not significant, probably because of the influence by maternal antibody.

4346 CAUSES OF DEATH IN FULMINANT HEPATIC FAILURE AND RELATIONSHIP TO QUANTITATIVE HISTOLOGICAL ASSESSMENT OF PARENCHYMAL DAMAGE. (Eng.) Gazzard, B. G.; Portmann, B.; Murray-Lyon, I. M.; Williams, R. (King's Coll. Hosp., London S.E.5, England). *Q. J. Med.* 31(3):615-626; 1975.

The clinical course and causes of death in 132 consecutive patients with fulminant hepatic failure and grade III or IV encephalopathy were reviewed. One hundred and five patients died, and an autopsy was performed in 96 of them. In 36 patients, there was cerebral edema, and the mean age of this group (30 ± S.D. 15 yr) was significantly younger ($p<0.05$) than the other fatal cases (40 ± S.D. 16 yr). In 28 patients, death was attributed to major hemorrhage, which originated in the gastrointestinal tract in 25. The prothrombin time ratio was not significantly greater in patients with major bleeding than in those without, but they did have a significantly lower platelet count (mean, 53,000 mm^3 ± S.D. 22,000 and 91,000 mm^3 ± S.D. 53,000, resp.; $p<0.05$). Sepsis contributed to death in 12 patients. In 25 patients, massive hepatic necrosis only was found at autopsy, and death was considered to be due solely to hepatic failure. The degree of hepatocyte loss was assessed in 80 fatal cases by a histological morphometric technique on a needle specimen of liver taken immediately postmortem. The proportion of the liver volume occupied by hepatocytes (hepatocyte volume fraction, HVF) was greatly reduced in all patients ($<12\%$, normal 85 ± S.D. 5%), but the mean value was significantly higher in the patients dying with sepsis, cerebral edema, or hemorrhage than in the group in whom death was attributed solely to hepatic failure ($p<0.01$ and $p<0.05$, resp.). There were 10 patients in whom liver function was improving at the time of death; death was attributed to cerebral edema (9) or hemorrhage (1). It is suggested that many patients presently dying from fulminant hepatic failure may be expected to survive, once more effective therapy is available for the complications of the illness.

4347 CONGENITAL HEPATIC FIBROSIS. (Eng.)

Hodgson, H. J. F.; Davies, D. R.; Thompson, R. P. H. (St. Thomas' Hosp., London SE1, England). *J. Clin. Pathol.* 29(1):11-16; 1976.

The cases of four male patients with congenital hepatic fibrosis are reported. In all cases, the diagnosis was confirmed by the presence of various types of renal disease and by a liver with a normal lobular architecture that was broken up by broad fibrous bands containing dilated and/or excess numbers of bile ducts and by reduced numbers of portal veins. In three patients, the age of onset of the disease was unusually late; patient 1 presented with his first hematemesis at age 36; patient 3 was not correctly diagnosed until age 52, having presented with jaundice and abdominal pain at 37; and patient 4 was not correctly diagnosed until age 32, having presented at 24 yr with epigastric pain due to duodenal ulcer. Patient 3 was diagnosed at age 15 after experiencing hematemesis. The renal involvement was minimal in patients 1 and 3 and more marked in patients 2 and 4. Patient 2 probably had juvenile polycystic disease. Patient 3 had medullary sponge kidney. The kidneys of the first patient showed fetal lobulation, and there was some interstitial fibrosis and many cysts around the corticomedullary junction. The combination of cholangitis and large numbers of bile ducts led to the misdiagnosis of biliary cirrhosis in patient 1. The extrahepatic biliary tree was normal in patients 1, 2, and 4, and the intrahepatic ducts were normal at autopsy in patient 1. In patient 3, the common bile duct was dilated, while the intrahepatic ducts were dilated only slightly due to the stones in the bile duct. Because these cases were diagnosed in one hospital over a 10-yr period, this condition may be more common than is generally recognized.

4348 RECTAL BIOPSY IN TYPE 4 GLYCOGENOSIS: AN ULTRASTRUCTURAL CYTOCHEMICAL STUDY. (Eng.)

Cantin, M.; Brochu, P.; Turgeon-Knaack, C.; Berdnikoff, G.; Simard, P.; Morin, C. (Dept. Pathology, Universite de Montreal, 2900 blvd Edouard Montpetit, Montreal, Quebec H3T 1J4, Canada). *Arch. Pathol. Lab. Med.* 100(8):422-426; 1976.

Rectal biopsy material from an infant girl who died at 13.5 months from type 4 glycogenosis was studied by ultrastructural cytochemical methods. The patient's case report and autopsy findings are presented. The rectal mucosa, particularly the surface epithelium, was filled with large, vacuolated macrophages containing filamentous material and small granules. There were no α-rosettes of glycogen. The filamentous material was stained by the Thiery method (periodic acid-thiocarbohydrazide-silver proteinate) after 18 hr of exposure to thiocarbohydrazide. β-Glycogen particles were seen within 30 min. Autopsy showed notable icterus, 550 ml of ascitic fluid, an enlarged cirrhotic liver, and splenomegaly. Large macrophages filled with PAS-positive, diastase-resistant material were found in the mucosae of the rectum, colon, and appendix, in the spleen and lymph nodes, and in the hepatic, Kuppfer, myocardial, and tongue muscle cells. The results suggest that the Thiery technique, when combined with other methods, may be a useful tool for the diagnosis of type 4 glycogenosis.

4349 BEHAVIOUR OF e ANTIGEN AND ANTIBODY DURING CHRONIC ACTIVE LIVER DISEASE: RELATION TO HB ANTIGEN-ANTIBODY SYSTEM AND PROGNOSIS. (Eng.)

Vogten, A. J. M.; Summerskill, W. H. J.; Gitnick, G. L.; Schalm, S. W.; Smith, J. L.; Murphy, B. L.; Maynard, J. E. (Mayo Foundation and Medical Sch., Rochester, MN). *Lancet* 2(7977):126-128; 1976.

Serial determinations of e antigen and e antibody (anti-e) were made in 20 patients with chronic active liver disease (CALD) and hepatitis B surface antigen (HBsAg) or antibody (anti-HBs). Five patients had anti-HBs and 15 had HBsAg. Sera from 30 age- and sex-matched control patients with CALD, but without HBsAg or anti-HBs, who were followed-up for similar lengths of time, served as controls. Of the 20 HBsAg or anti-HBs-positive patients, 10 were e antigen-positive. Four remained so continuously, five lost the antigen during treatment, and, in one patient, the antigen appeared during treatment. All were HBsAg-positive and none lost HBsAg or developed anti-HBs. Only three achieved resolution or complete remission of their disease with prednisone therapy; five failed treatment, and two developed cirrhosis. Among the patients with HBsAg or anti-HBs but without e antigen, only three did not lose HBsAg and five others developed anti-HBs. Seven patients responded well to treatment. Two patients failed treatment, and two developed cirrhosis. Anti-e was temporarily present in three patients, two of whom also had anti-HBs. Only one patient with anti-e responded well to treatment. It is proposed that the presence of the e antigen is associated with impaired host-immune responses to hepatitis B virus infection and a poor prognosis.

4350 LIVER DYSFUNCTION AND HISTOLOGIC ABNORMALITIES IN NEONATAL HYPOPITUITARISM. (Eng.)

Herman, S. P.; Baggenstoss, A. H.; Cloutier, M. D. (Mayo Clinic, 200 First St. SW, Rochester, MN 55901). *J. Pediatr.* 87(6, part 1):892-895; 1975.

Two cases of neonatal aplasia or hypoplasia of the pituitary occurring with the neonatal hepatitis syndrome are reported. The first patient developed apnea, cyanosis, hypotonia, and generalized seizures at 24 hr of age. Serum bilirubin was 7.8 mg/dl, total. At 8 days of age, she was icteric; bilirubin was 8.6 mg/dl, total, and SGOT was 107 U/l. She had frequent hypoglycemic seizures, persistent jaundice, and a serum bilirubin level that peaked at 4.5 mg/dl. A wedge liver biopsy revealed numerous multinucleated giant hepatocytes, moderate bile stasis, a decreased number of interlobular bile ducts, and increased numbers of lymphocytes, histiocytes, fibroblasts, neutrophils, and collagenous connective tissue. At 12 months, the SGOT was 47 U/l and total serum bilirubin was 0.4 mg/dl. The insulin level was 1.7 μU/ml, while the glucose level was 9 mg/dl; at this time, the blood cortisol level was 2 μg/dl, and the growth hormone level was 1.5 ng/ml. Thyroid-stimulating hormone was 3.4 μU/ml. Hypopituitarism was diagnosed, and the patient improved with hydrocortisone and growth hormone therapy. The second patient was recognized as hypoglycemic at 12 hr of age. He was blind, icteric, the liver was palpable, SGOT was 89 U/l, and total serum bilirubin was 2.6 mg/dl. The wedge liver biopsy findings were similar to those of the first patient, although the giant cells were not as numerous or as large. The child remained free of seizures, and growth improved after 3 months of replacement thyroid and steroid therapy. The authors hypothesize that the absence of a hormone normally released from the pituitary might be responsible for the development of the liver dysfunction and histologic changes.

4351 ACID HYDROLASE ACTIVITIES AND LYSOSOMAL INTEGRITY IN LIVER BIOPSIES FROM PATIENTS WITH IRON OVERLOAD. (Eng.) Peters, T. J.; Seymour, C. A. (Royal Postgraduate Medical Sch., Du Cane Rd., London W12 OHS, England). *Clin. Sci. Mol. Med.* 50(1):75-78; 1976.

To clarify the mechanism of iron toxicity, iron, acid phosphatase, and *N*-acetyl-β-glucosaminidase were assayed in liver biopsy specimens from eight control subjects without liver damage, eight patients with idiopathic cirrhosis, six patients with untreated primary hemochromatosis, and eight patients with secondary hemochromatosis and thalassemia major. The activity of total acid phosphatase was significantly higher in the specimens of patients with iron overload (mean=27.5 mU/mg protein in primary hemochromatosis and 24.8 mU/mg in secondary hemochromatosis) than in those from either the controls (11.0 mU/mg) or the cirrhotic patients (12.1 mU/mg). The levels of latent *N*-acetyl-β-glucosaminidase were significantly decreased in the patients with primary hemochromatosis (29.0%) and secondary hemochromatosis (32.1%), in comparison with controls (66.5%) and cirrhotics (59.7%); the level of sedimentable *N*-acetyl-β-glucosaminidase was also decreased in patients with primary (32.5%) and secondary hemochromatosis (33.0%), in comparison with controls (67.8%) and cirrhotics (64.4%). These results indicated that lysosomes from the livers of patients with iron overload are more fragile than those of the other subjects. The authors suggest that iron accumulation damages the lysosomal membrane, releasing acid hydrolases into the cytoplasm and thus, initiating cell damage.

4352 DIFFERENTIAL DIAGNOSIS OF THE HEPATIC PORPHYRIAS. (Eng.) Anonymous. (No affiliation given). *Br. Med. J.* 4(5999):725-726; 1975.

A brief review of the literature concerning the differential diagnosis of hepatic porphyrias is presented. Porphyria presents either as an acute disease with abdominal pain, vomiting, and neuropsychiatric manifestations, or as a photosensitizing disease of the skin. The basis of diagnosis is the accurate measurement of porphyrin concentrations in urine, feces, and blood, usually by simple extraction techniques followed by spectrophotometric or spectrofluorometric measurement of the porphyrin fractions. Another promising method is high pressure liquid chromatography. Only three forms of hepatic porphyria are likely to present with skin lesions: cutaneous hepatic porphyria, variegate porphyria, and hereditary coproporphyria; of these, only variegate porphyria and cutaneous hepatic porphyria are likely to be confused. Normally they may be distinguished by the lack of familial history and the absence of porphyrin precursor excretion in cutaneous porphyria. The importance of the differential diagnosis of hepatic porphyrias is stressed as the current treatment of cutaneous hepatic porphyria, venesection, has little effect on variegate porphyria.

4353 AN AFLATOXIN IN THE LIVER OF A PATIENT WITH REYE-JOHNSON SYNDROME. (Eng.) Chaves-Carballo, E.; Ellefson, R. D.; Gomez, M. R. (Univ. Iowa Coll. Medicine, Iowa City, IA). *Mayo Clin. Proc.* 51(1):48-50; 1976.

Liver specimens from eight patients with Reye-Johnson syndrome, two patients with acute encephalopathy, and ten patients without liver disease were analyzed chromatographically for the presence of aflatoxins. The case report of the one patient in whom aflatoxin was found is presented. The patient was a 15-yr-old girl who died of Reye-Johnson syndrome (characterized by fever, cough, SGOT level of 133 U/l, blood ammonia level at 410 μg/dl, coma, apnea, cerebral edema with tonsillar herniation, and fatty liver). Maximum fluorescence emission in methanolic solution at 365-nm excitation was 425 nm for an unknown aflatoxin, 425 nm for standard aflatoxin B_1, and 450 nm for standard aflatoxin G_2. The infrared absorbance spectrum of the unknown aflatoxin corresponded closely with the infrared spectrum of aflatoxin B_1. The concentration was 22.5 μg/kg (measured as aflatoxin B_1). The differences in physicochemical properties between this substance and aflatoxin B_1 may have been caused by the fixation of the liver specimen in formaldehyde, which may have resulted in an aflatoxin derivative structurally related to aflatoxin B_1. It is suggested that aflatoxin analyses be performed whenever tissues are available from patients with Reye-Johnson syndrome.

4354 ACUTE LIVER FAILURE AND ENCEPHALOPATHY (REYE'S SYNDROME?) DURING SALICYLATE THERAPY.

(Eng.) Sillanpaa, M.; Makela, A.-L.; Koivikko, A. (Dept. Pediatrics, Univ. Turku, Turku, Finland). *Acta Paediatr. Scand.* 64(6):877-880; 1975.

A case of acute liver failure and encephalopathy occurring in a 13-yr-old girl during salicylate therapy (microcrystalline acetyl salicylic acid, 82 mg/kg/day) for joint pain and edema is reported. Salicylate was discontinued after 10 days, when the patient became confused and developed hematemesis, vertigo, convulsions, limb spasticity, elevated serum ammonium (130 μM), and elevated SGOT (≈3,000 U/l). The patient demonstrated the typical features of Reye's syndrome, but without acidosis and hypoglycemia. The patient became comatose, and an EEG exhibited strong general slowing and low amplitude activity intermingled with occasional spindle activity. The liver became enlarged. Two exchange transfusions, with a total of 5,000 ml of blood, were performed. After 60 hr, the patient regained consciousness and improved rapidly; the liver enlargement disappeared, and serum ammonium and SGOT decreased to normal levels. The patient was asymptomatic 10 months later, and the joint symptoms did not recur. In agreement with other reported cases of Reye's syndrome, this patient had serum salicylate concentrations that did not exceed the serum therapeutic levels.

4355 MORPHOLOGICAL CHANGES IN LIVER BIOPSIES FROM PATIENTS WITH RHEUMATOID ARTHRITIS.

(Eng.) Dietrichson, O.; From, A.; Christoffersen, P.; Juhl, E. (Kommunehospitalet, DK 1399 Copenhagen K, Denmark). *Scand. J. Rheumatol.* 5(2):65-69; 1976.

The hepatotoxic effect of long-term therapy with oxyphenisatin was investigated in 26 consecutive patients (aged 16-78 yr) with rheumatoid arthritis ranging in duration from 2 months to 34 yr. In all cases, liver biopsy, biochemical liver function tests, and determination of hepatitis B antigen were performed. Ten patients showed no pathological changes in the liver biopsy, and a further two patients had only non-specific changes. Seven patients had fatty liver, five had passive congestion, one had hemosiderosis, and only one had cirrhosis of the liver. The mean duration of treatment with oxyphenisatin, in the 12 patients without significant liver biopsy changes was 4 yr (0-19 yr range), and the duration for the 14 patients with an abnormal biopsy was 7 yr (0-33 yr range), which was not a statistically significant difference. No correlation was found between the activity of rheumatoid arthritis, the duration of the disease, the drug therapy given, and the liver damage. It is concluded that the majority of liver changes seen in rheumatoid arthritis are nonspecific and unrelated to the disease itself or to the drugs used in its treatment.

4356 PLATELET FUNCTION AND COAGULATION IN PATIENTS WITH WILSON DISEASE.

(Eng.) Owen, C. A., Jr.; Goldstein, N. P.; Bowie, E. J. W. (Mayo Clinic, Rochester, MN 55901). *Arch. Intern. Med.* 136(2):148-152; 1976.

Platelet function and coagulation were studied in 16 patients with Wilson disease (hepatolenticular degeneration). Five patients had a mild bleeding tendency that was characterized by easy bruising. Moderate thrombocytopenia (55-138 x 10^3 platelets/mm^3) was observed in three of the five bleeders and in two of the others. One bleeder was thrombocytotic (516 x 10^3 platelets/mm^3) and hyperfibrinogenemic (468 mg/dl). Bleeding times, platelet retention, and prothrombin consumption were rarely abnormal. However, 15 of the 16 patients had some abnormality of platelet aggregation: one, when ADP (1-20 μmol) was added to platelet rich plasma; three, when epinephrine (5.5 and 55 μmol) was added; and the remainder, when collagen was added. The collagen abnormalities were delayed or absent aggregation (5 patients, 4 of whom were bleeders) and absence of a change of shape (12 of the 16 patients). Platelet aggregation was completely normal in only one patient.

4357 GENETIC DEFECT OF CERULOPLASMIN SYNTHESIS IN LIVER POLYRIBOSOMES IN WILSON'S DISEASE.

(Rus.) Vakharlovskii, V. G.; Gaytskhoki, V. S.; Kiselev, O. I.; Moshkov, K. A.; Puchkova, L. V.; Shavlovskii, M. M.; Shulman, V. Sh.; Neyfakh, S. A. (Scientific Res. Inst. Experimental Medicine, Leningrad, USSR). *Dokl. Akad. Nauk SSSR* 222(3): 716-719; 1975.

The genetic defect of ceruloplasmin synthesis in liver polyribosomes was studied in biopsy specimens from patients with hepatolenticular degeneration and in patients with nonhepatic diseases (controls). The level of native ceruloplasmin chains in polyribosomes was studied by two specific immunochemical methods: immunoprecipitation of neosynthesized, polyribosome-bound polypeptide chains of ceruloplasmin and of complete ceruloplasmin polypeptides following short-term incubation of acellular liver preparations with ^{14}C-amino acids, and by quantitative assessment of the *in vivo* preformed ceruloplasmin-synthesizing polyribosomes by conjugation with ^{125}I-anti-ceruloplasmin immunoglobulins. Centrifugation in a saccharose gradient revealed the highest ^{125}I-antibody level in the relatively heavy polyribosome fraction (with 8-12 monoribosomes per messenger RNA molecule) in hepatolenticular degeneration, while the ^{125}I-antibody level was highest in the lighter polyribosomes (with 4-5 monomers) in the controls. A very substantial reduction occurred in the percentage of neosynthesized ceruloplasmin in the ^{14}C-labeled polypeptide fractions of polysomes, monoribosomes, and in free protein in the liver of patients with Wilson's disease. The findings indicate a significant reduction in the level of preformed native ceruloplasmin chains and of ceruloplasmin-synthesizing polyribosomes in the liver as the cause of the ceruloplasmin deficit in patients with hepatolenticular degeneration.

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See also, 3983, 3988, 3989, 3998, 4007, 4021, 4024, 4025, 4028, 4032, 4036, 4037, 4039, 4040, 4045, 4048, 4050, 4054, 4063, 4064, 4066, 4070, 4071, 4074, 4077, 4079, 4082, 4110, 4169, 4228, 4251, 4414, 4417, 4447, 4477, 4491, 4495, 4546, 4571, 4573.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

4398 PHOTOTHERAPY. SHORT AND LONG-TERM COMPLICATIONS. (Eng.) Drew, J. H.; Marriage, K. J.; Bayle, V. V.; Bajraszewski, E.; McNamara, J. M. (Mercy Maternity Hosp., Clarendon St., East Melbourne, Victoria 3002, Australia). *Arch. Dis. Child.* 51(6):454-458; 1976.

The short and long term complications of the use of phototherapy for hyperbilirubinemia in 300 consecutively-treated infants were investigated. Phototherapy was begun when the serum bilirubin level was 12 mg/100 ml or greater in term infants and 10 mg/100 ml or greater in preterm infants. The age range at assessment of the treated infants was 8 to 24 months. The mean duration of phototherapy treatment was 35 hr (range 18-144 hr). Complications occurring during treatment included fever (150 infants), diarrhea (81), irritability (57), rash (35), and bronze baby syndrome (1 infant). Five infants died. No evidence of bilirubin encephalopathy or damage attributable to phototherapy was observed at autopsy. Eighty-nine infants were approximately 1 yr of age or more; 54 of these and 67 of 90 control infants were assessed in a longitudinal study. The overall incidence of major abnormalities detected included: abnormal Denver Developmental Screening Test (DDST) results in four treated infants; squint in five; and retrolental fibroplasia, ventricular septal defect, and atrial septal defect each in one infant. In the control group, there was one instance each of abnormal DDST, convulsions, squint, and funnel chest, and two cases of atrial septal defect. This study suggests that although phototherapy is a useful therapeutic agent, complications during its usage are common. It is suggested that phototherapy should not be used indiscriminately for hyperbilirubinemia until the results of further long term studies are available.

4399 BILIRUBIN IN BLOOD AND SPINAL FLUID IN JAUNDICED PATIENTS. (Por.) Lima, J. P.; Kalil, T. D.; Macedo, M. F. A. B. (Fundacao Faculdade Catolica de Medicina de Porto Alegre, Porto Alegre, Brasil). *Arq. Gastroenterol.* 12(2):95-103; 1975.

The presence of bilirubin in cerebrospinal fluid (CSF) and blood serum, and its relationship with xanthochromia, CSF proteins, and duration and intensity of the jaundice was studied in 30 icteric women with infectious hepatitis (20), intrahepatic cholestasis, and malignant or benign biliary tract obstruction (4 and 1, resp). The patients had no meningeal impairment or previous drug exposure capable of interfering with the bilirubin-albumin binding in the blood. In 14 control subjects with no liver diseases or neurological disturbances capable of altering the CSF, total serum bilirubin, CSF proteins, and the CSF leukocyte count were found within normal limits; only one had bilirubin (0.09 mg/100 ml, total) in the CSF. The patients with liver diseases presented asymmetrical levels not suitable for obtaining a linear correlation coefficient. They were consequently divided into group 1 (22/30 without bilirubin in the CSF) and group 2 (8/30 with 0.09-0.32 mg/100 ml total CSF bilirubin) and evaluated with the Student's "t" distribution test. No relation could be demonstrated between xanthochromia found in eight patients from group I and in six patients from group 2, and the CSF bilirubin levels. CSF protein levels showed no statistical difference between the two groups ($p<0.05$). A direct relationship was found between serum and CSF bilirubin and the intensity and duration of the jaundice; bilirubin in the CSF was mainly distributed among intensely icteric patients and patients with jaundice of longer duration. In both instances, the statistical difference between the two groups was $p<0.001$ and $p<0.025$, resp.

4400 JAUNDICE ASSOCIATED WITH BACTERIAL INFECTION IN INFANTS. (Pol.) Szczurowna, M.; Ulewicz-Filipowicz, J.; Mazur, E. (Instytut Pediatrii AM, 80-211 Gdansk-Wrzeszcz, ul. Debinki 7, Poland). *Pol. Tyg. Lek.* 30(50):2099-2101; 1975.

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LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

4401 EPIDEMIC OF HEPATITIS IN MAN DUE TO AFLATOXICOSIS. (Eng.) Anonymous (No affiliation given.) *Nutr. Rev.* 34(2):45-46; 1976.

A report of an epidemic in India of hepatitis due to the consumption of maize heavily contaminated with *Aspergillus flavus* is reviewed. The epidemic was attributed to aflatoxicosis because: it occurred during the harvest of maize; it was confined to the poor who subsisted mainly on poorly stored maize that had been affected by excessive rain; it occurred in dogs that had shared the food; and it did not occur among inmates of a hostel, located in the same region, for whom maize was not the staple. The aflatoxin content found in random samples of maize varied from 6.25 to 15.6 ppm, which means that the affected subjects must have consumed 2-6 mg of toxin daily for almost 1 month. Aflatoxin B_1 was not found in any of several urine samples or in one liver sample. Two of seven serum specimens had traces of aflatoxin B_1, and histopathologic examination of the liver specimen showed multinucleated giant cells. This report incriminates aflatoxin in liver damage in man and shows that staples other than peanuts can become infected with *A. flavus*.

4402 HEPATITIS ASSOCIATED WITH DANTROLENE SODIUM. (Eng.) Ogburn, R. M.; Myers, R. L.; Burdick, G. E. (Letterman Army Medical Center, Presidio San Francisco, San Francisco, CA 94129). *Ann. Intern. Med.* 84(1):53-54; 1976.

A case of acute hepatitis in a 26-yr-old man being treated for Friedreich's ataxia with dantrolene sodium is presented. The patient initially received dantrolene (25 mg, 4 times daily) for 3 weeks; the treatment was discontinued at this time because it exacerbated his dysarthria. His SGOT was normal. Three and one-half years later, the treatment was reinstituted for 10 days, at which time increasing dysarthria forced a discontinuance of the treatment. The patient developed symptoms of hepatitis 14-21 days after discontinuing dantrolene treatment, but he did not manifest the fever, lymphadenopathy, rash, hepatomegaly, or systemic eosinophilia associated with diphenylhydantoin-induced hepatitis. His SGOT decreased from 740 mU/ml at admission to 52 mU/ml 22 days later; all other tests were normal. Twenty-four days later, a lower dosage of dantrolene (25 mg, twice daily) was given for 10 days, and again discontinued. On the 10th day, SGOT was 115 mU/ml, and total bilirubin was 2.1 mg/dl. The symptoms of hepatitis returned; SGOT was 1,150 mU/ml, bilirubin was 4.5 mg/dl, and there were prominent accumulations of eosinophils in the liver biopsy. The evidence suggests that dantrolene did cause hepatitis in this patient.

4403 DIPHENYLHYDANTOIN SENSITIVITY. A SYNDROME RESEMBLING INFECTIOUS MONONUCLEOSIS WITH A MORBILLIFORM RASH AND CHOLESTATIC HEPATITIS. (Eng.) Weedon, A. P. (Univ. Coll. Hosp., London, England). *Aust. N.Z. J. Med.* 5(6):561-563; 1975.

After 39 days of diphenylhydantoin (DPH) therapy, a 10-yr-old boy developed a syndrome resembling infectious mononucleosis combined with a morbilliform rash and cholestatic hepatitis. The rash was associated with fever and pharyngitis. The SGOT was 248 IU/l and increased to 400 IU then decreased. Serum bilirubin rose to 17.8 mg/100 ml, serum alkaline phosphatase was elevated at 625 IU/l, and the rash became exfoliative. A liver needle biopsy showed marked centrilobular cholestasis with some ballooning of hepatocytes. The portal tracts were edematous, and contained eosinophils and polymorphs. The patient gradually improved after 9 months of corticosteroid therapy (prednisone, 2.5 mg/kg/day), although his alkaline phosphatase level remained elevated at 850 IU/l. The patient's DPH dose was originally 300 mg/day; after 7 days it was reduced to 200 mg/day. After 18 days, his serum level was 23 μg/ml, and 8 days after discontinuing the drug, it was 3.1 μg/ml. These DPH levels exclude a metabolic defect with resultant toxic levels as an etiological factor in this syndrome. The fairly constant time lag from the onset of therapy to the development of symptoms, the eosinophilia, and the positive results of challenge doses in some previously reported cases with similar symptoms, all suggest that the syndrome is a rare reaction to DPH.

4404 DIAGNOSIS OF HALOTHANE-RELATED HEPATITIS. (Eng.) Moult, P. J. A.; Sherlock, S. (Royal Free Hosp., London NW3 2QG, U.K.). *Proc. R. Soc. Med.* 68(12):768-769; 1975.

Twenty-six patients who had become jaundiced within 2 weeks of receiving halothane anesthesia were studied to clarify the distinction between halothane and hepatitis B antigen-negative hepatitis. Only 1 of the 22 patients for whom temperature charts were available remained apyrexial. Coincidental virus A hepatitis was considered unlikely as the cause of jaundice in these patients for four reasons: there was a close temporal relation between exposure to halothane and onset of icterus; reactivation of latent infection was unlikely, as no relation was found between the severity of hepatitis and the degree of surgical stress; the mean age of these patients (56.4 ± 11.6 yr, 17 patients) was older than in a group of 19 virus A hepatitis patients (36.1 ± 16.4 yr); and of the 26 patients, 18 had received halothane twice within 28 days, while only 7% of unselected surgical patients received halothane. The authors suggest that unexplained jaundice after halothane administration is indicative of halothane sensitivity.

4405 LONG-TERM PERHEXILINE MALEATE AND LIVER FUNCTION. (Eng.) Howard, D. J.; Rees, J. R. (Bristol Royal Hosps., Bristol BS1 6SY, U.K.). *Br. Med. J.* 1(6002):133; 1976.

The long term effect of perhexiline maleate on liver function was studied in 6 men taking 200 mg per day and in 10 men taking 400 mg per day for an average of 12.5 months. Liver function was assessed during the treatment, 1 month after discontinuing the treatment, and during the following month, when the treatment had been reinstituted. Seven patients while on the drug had abnormal serum transaminase levels (>25 IU/l) at some time before the trial. In four patients, this abnormality resolved spontaneously, in two it resolved with reduction of the dose from 400 to 200 mg/day, and in one the levels were persistently abnormal at 25 IU/l. Aspartate aminotransferase was elevated in three patients, but did not exceed 32 IU/l; two patients developed the abnormality while off the drug. D-glutamyltransferase (DGT) was high in two patients on 200 mg and in six on 400 mg per day (mean= 49 ± 8 IU). Of the 12 patients able to complete the 1-month period without the drug, 7 had elevated DGT levels (31-100 IU) during the initial treatment; after the month without the drug, the levels in all patients decreased (17-58 IU) significantly. There was no statistically significant change after restarting the drug. Baseline BSP excretion was abnormal (>6 μM) in three men on 200 mg and in nine on 400 mg per day. Of the seven men who stayed off perhexiline maleate for a month, BSP retention decreased significantly from a mean of 10.4 μm to 5.1 μm at 45 min. Impotence was a side-effect of the drug in 12 patients, and dysuria was a side effect in 2 patients. The sensitive DGT and BSP excretion tests indicated liver-specific abnormalities in 50 to 75% of the patients. Since the results of these tests did not always run parallel, it is suggested that they measure independent features of liver metabolism affected to different degrees in different patients. The authors regard the abnormalities as acceptable in view of the success of perhexiline maleate in relieving anginal pain, but recommend treatment with the smallest effective dose.

4406 PELIOSIS HEPATIS IN A CHILD. (Eng.) Usatin, M. S.; Wigger, J. (Coll. Physicians and Surgeons, Columbia Univ., New York, NY). *Arch. Pathol. Lab. Med.* 100(8):419-421; 1976.

A case of peliosis hepatis in an 11-yr-old boy with cystic fibrosis is reported. His medications during the last 2 yr of life included methandrostenolone, acetylcysteine, phenylephrine hydrochloride, gentamicin sulfate, pancrelipase, vitamin B complex, vitamin K, pyridoxine hydrochloride, vitamin E, chlorothiazine, spironolactone, ampicillin trihydrate, gentamicin sulfate, and chloramphenicol. Death was due to a 50% pneumothorax on the right side, *Pseudomonas aeruginosa* sepsis, and worsening cardiopulmonary status. The liver changes corresponding to peliosis hepatis were blood-filled spaces of varying density, measuring from 0.1 to 0.8 cm. All spaces lined with endothelium were venous with mostly central veins. The lining sometimes showed transition to sinusoidal spaces, possibly from rupture. Other blood spaces were apparently surrounded solely by liver cell plates and appeared to be continuous with congested sinusoids. About 20-25% of the spaces were filled with thrombi in various stages of development. Platelet fibrin thrombi, hemosiderin deposition, cholestasis, vasculitis, and fibrinoid necrosis were absent. Chronic illness, long-term anabolic steroid therapy, and right ventricular congestive failure may all have contributed to the development of peliosis hepatis. Both the phlebectatic and parenchymal types, of which were previously thought to be separate, were found together in this case. This is compatible with its origin from right ventricular congestive failure. The rarity of peliosis, especially in children, indicates that other factors may be involved in its development.

4407 SALICYLATE HEPATOTOXICITY IN REITER'S SYNDROME. (Eng.) Ricks, W. B. (Dwight David Eisenhower Army Medical Center, Fort Gordon, GA 30905). *Ann. Intern. Med.* 84(1):52-53; 1976.

The case of an 18-yr-old man with Reiter's disease who developed salicylate-induced hepatotoxicity presented. The patient experienced pain in the right knee, a urethral discharge, and penile lesions. A biopsy of the penile lesion showed pustular psoriasiform lesions consistent with Reiter's disease. After 8 days of treatment with aspirin (600 mg, every 4 hr), the patient's SGOT had risen to 1,200 IU/l. SGPT was 1,000 IU, alkaline phosphatase was 160 IU/l, and total bilirubin was 1.0 mg/dl. The salicylate level was 24 mg/dl. Enzyme levels returned to normal after the aspirin was discontinued. A high frequency of HL-A W27 was observed in patients with Reiter's disease and in those with juvenile arthritis; this could be a marker or share a common location with a marker for hepatic sensitivity to salicylate

LIVER AND BILIARY TRACT

4408 BLOOD SERUM IMMUNOGLOBULIN CONTENT IN PATIENTS WITH TOXIC HEPATITIS. (Rus.) Liubchenko, P. N. (M. F. Vladimirskii Oblast Clinic, Moscow, USSR). *Gig. Tr. Prof. Zabol.* (12):32-35; 1975.

4409 CLINICAL-MORPHOLOGICAL VARIANTS OF ALVEOLAR HYDATID DISEASE OF THE HUMAN LIVER. (Rus.) Tumol'skaia, N. I.; Ozeretskovskaia, N. N.; Potekaeva, M. A. (E. I. Martsinovskii Inst. Medical Parasitology and Tropical Diseases, USSR Ministry Health, Moscow, USSR). *Med. Parazitol. (Mosk.)* 46(3):277-281; 1975.

See also, 4354.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

4410 REPETITIVE MATERNAL-FETAL TRANSMISSION OF FATAL HEPATITIS B. (Eng.) Fawaz, K. A.; Grady, G. F.; Kaplan, M. M.; Gellis, S. S. (Tufts-New England Medical Center, 171 Harrison Ave., Boston, MA 02111). *N. Engl. J. Med.* 293(26):1357-1359; 1975.

Two cases of fatal hepatitis in 3-month-old infants born successively to an asymptomatic carrier of hepatitis B surface antigen (HBsAg) are reported, and the literature is reviewed. The index patient, a boy, developed hepatitis after an uncomplicated gestation, full-term delivery, and 3 months of normal growth and development. HBsAg was detected by radioimmunoassay and counterelectrophoresis. Intramuscular injections of 3 ml of globulin with an anti-HBs titer of 1:500,000 in divided doses resulted in an increase in serum anti-HBs from zero to 1:256, peaking at 1:512, and a decrease in HBsAg to undetectable levels. The patient showed no clinical improvement and died on the 13th hospital day. Two years earlier, a 3-month-old female sibling developed similar symptoms, and she followed an identical clinical course. Massive hepatic necrosis was found at autopsy in both patients. Other authors have described hepatitis occurring in a total of 5% of infants born to 79 asymptomatic carriers of HBsAg. Retrospective studies imply that severe or fatal hepatitis B in the neonate is relatively more likely when the mother is an asymptomatic carrier of HBsAg, even though transmission of infection per se is most likely when she has acute hepatitis late in pregnancy or during the postpartum period.

4411 EVIDENCE FOR VIRAL HEPATITIS OTHER THAN TYPE A OR TYPE B AMONG PERSONS IN COSTA RICA. (Eng.) Villarejos, V. M.; Visona, K. A.; Eduarte, C. A.; Provost, P. J.; Hilleman, M. R. (Louisiana State Univ. International Center Medical Res. Training, Apdo 10155, San Jose, Costa Rica). *N. Engl. J. Med.* 293(26):1350-1352; 1975.

One hundred and three patients (64 with overt clinical hepatitis and 39 with subclinical infection as determined by liver function tests), who were residents of a community in Costa Rica in which hepatitis A and B are endemic, were examined for viral hepatitis other than type A or B. Antibodies against hepatitis A were detected by the immune-adherence assay, immunoassay and passive hemagglutination, resp., and for antibodies against cytomegalovirus by complement fixation. Twelve cases in which both type A and type B hepatitis were excluded on the basis of serologic testing were encountered; their case reports are presented. In all but one of these patients, cytomegalovirus infection was also excluded. The patients had not had blood transfusions, and available evidence pointed to person-to-person transmission. The illness in these patients was evidently neither hepatitis A nor hepatitis B and qualifies for consideration as the still hypothetical third type of hepatitis ("C"?).

4412 SANDED NUCLEI IN HEPATITIS B: EOSINOPHILIC INCLUSIONS IN LIVER CELL NUCLEI DUE TO EXCESS IN HEPATITIS B CORE ANTIGEN FORMATION. (Eng.) Bianchi, L.; Gudat, F. (Dept. Pathology, Univ. Basel, Basel, Switzerland). *Lab. Invest.* 35(1):1-5; 1976.

Nuclear eosinophilic inclusions due to excess hepatitis B core antigen (HBcAg) particles were identified and studied by electron microscopy and direct immunofluorescence in 96 liver biopsy specimens from patients with chronic hepatitis B virus infection. As the euchromatin space of affected nuclei was "sanded" by numerous core particles, with concomitant dissolution of the chromatin network, spiky, finely granular, and eosinophilic inclusions without a limiting membrane became visible in hematoxylin and eosin-stained paraffin sections. These HBcAg inclusions stained greyish pink with chromotrope aniline blue and were negative for orcein, the PAS reaction, and the Feulgen reaction for DNA. Sanded nuclei were detected exclusively in hepatitis B antigen (HBAg)-positive patients when a focal (in chronic aggressive hepatitis) or a generalized core forma-

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tion (in immunosuppressed kidney transplant recipients) was demonstrated by electron microscopy or immunofluorescence. In the former case, sections taken from 5 of 31 seropositive patients with chronic aggressive hepatitis had about 1% sanded nuclei in each section; in the latter case, the sections taken from 4 of 14 patients with immunosuppression had 1-3% sanded nuclei in each section. The presence of sanded nuclei in a persistent hepatitis B virus infection indicates an excessive core formation, the extent of which should be verified.

4413 HEPATITIS A: PERSPECTIVES AND RECENT ADVANCES.

(Eng.) Maynard, J. E. (Center for Disease control, 4402 North Seventh St., Phoenix, AZ 85014). *Am. J. Pathol.* 81(3):683-694; 1975.

Historical background, tissue culture studies, animal infectivity studies, preliminary characterization, classification, and strain characterization are emphasized in a review of hepatitis A. The basis for the epidemiologic and etiologic differentiation of hepatitis A and B was established in a series of studies undertaken between 1930 and 1970. Final recovery and visualization of the presumed etiologic agent of hepatitis A was not, however, accomplished until the technique of immune electron microscopy was applied to the examination of specimen materials collected from individuals in the early acute stages of infection. Morphologically homogeneous virus-like particles of 27 nm diameter have now been recovered from stools of patients with hepatitis A who were ill from a variety of sources. Antibody to these particles has been shown to develop during the course of infection with hepatitis A but not with hepatitis B, and disease has been induced in non-human primates inoculated with purified particle containing fractions. The classification of hepatitis A virus has not been conclusively established, but it would appear to be either a parvovirus or an enterovirus.

4414 THE RELATIONSHIP BETWEEN HEPATITIS B ANTIGEN, e-ANTIGEN, AND LIVER-PATHOLOGY IN PATIENTS TREATED WITH DIALYSIS.

(Eng.) Nordenfelt, E.; Lindholm, T.; Henrikson, H. (Univ. Hosp., Lund, Sweden). *Scand. J. Urol. Nephrol.* 9(3):277-281; 1975.

The relation between hepatitis B antigen (HBAg), e-antigen, and liver pathology was studied in 27 patients who had died after regular dialysis treatment. HBAg was determined by immunodiffusion and counterelectrophoresis, and e-antigen was determined by immunodiffusion. The examination of the liver histology was done without knowledge of the history of the patient. Seventeen patients were HBAg-positive at death and had been carriers of the antigen for between 1 and 57 months. Two had chronic aggressive hepatitis, and 10 had chronic persistent hepatitis, but 5 had no histological signs of chronic hepatitis. e-Antigen was found in blood samples from all of these patients. The cause of kidney diease, duration of dialysis, and time of carriership of HBAg showed the same variation among the patients without signs of chronic hepatitis as among those with positive signs. Two patients who had been HBAg-positive, but were negative at death, had no signs of chronic hepatitis. HBAg-positive samples available from one of these patients were also positive for e-antigen. Eight patients who were constantly negative for HBAg were also negative for e-antigen. One of them had autopsy findings of a chronic persistent hepatitis. There were thus very moderate or even no histological signs of chronic hepatitis among these patients, in spite of prolonged carriership of HBAg. A very close correlation between HBAg and e-antigen in dialysis patients was also discovered.

4415 PROPERTIES OF LYMPHOCYTES IN CHRONIC HBAg POSITIVE HEPATITIS. AN APPROACH TO PATHOGENETIC PROBLEMS.

(Eng.) Tolentino, P.; Pasino, M.; Braito, A.; Giacchino, R. (Dept. Infectious Diseases, Univ. Genova, via 5 Maggio 39, Genova, Italy). *Infection* 3(2):78-82; 1975.

Lymphocytes from 22 children with chronic hepatitis were studied and compared to lymphocytes from 32 healthy children, with respect to PHA dose-response curves, E-rosette formation, and membrane immunoglobulin (Ig). The PHA dose-response curves were displaced to the left (low PHA dose), DNA synthesis was significantly higher for all PHA doses tested (0.001-0.1 ml/ml of culture media), and the plasma of chronic hepatitis patients (CHP) acted neither as an inhibitor nor a stimulator. The percentage of E-rosette forming cells was constantly decreased in CHP. The mean value observed was 49.3%, with a range of 41.0-66.5%, compared to the mean of 69.8% with a range of 57.8-83.2% for controls. The total mean number of E-rosette forming cells/mm^3 for CHP (1,693/mm^3) was almost the same as that of the control group (1,675/mm^3). Distribution over a wide range was observed in CHP (886-2,668/mm^3) compared to controls (1,387-1,997/mm^3). The mean value of membrane immunofluorescent cells was 19.7% (788/mm^3) with a range of 6.0% (334/mm^3) to 35.4% (1,753/mm^3); this did not differ significantly from the control group. The results indicate that enhanced PHA-stimulation of lymphocytes occurs, at least in the chronic stage, as illustrated by PHA dose-response curves; this test is considered the most valid assessment of lymphocyte reactivity.

4416 CORRELATION BETWEEN FLUORESCENT ANTIBODY DETECTION OF HEPATITIS B CORE ANTIGEN IN LIVER BIOPSIES AND THE PRESENCE OF e ANTIGEN IN SERUM.

(Eng.) Murphy, B. L.; Peterson, J. M.; Smith, J. L.; Gitnick, G. L.; Auslander, M. O.; Berquist, K. R.; Maynard, J. E.; Purcell, R. H. (Bureau Epidemiology, Center Disease Control, Phoenix, AZ 85014). *Infect. Immun.* 13(1):296-297; 1976.

Liver biopsies and/or necropsy liver specimens (chimpanzee and human) taken from long-term carriers of hepatitis B surface antigen (HBsAg) were examined by fluorescent antibody techniques for HBsAg and hepatitis B core antigen (HBcAg). The biopsies were evaluated to determine whether HBsAg carriers of the e antigen demonstrate a more effective HBcAg synthesis than carriers without the e antigen. The presence of HBcAg in liver biopsy sections of both chimpanzees and humans was positively correlated with the detection of e antigen, and similarly, the absence of HBcAg was correlated with e antibody in the sera. HBcAg was detected in biopsies of 10 e antigen-positive subjects and in only 1 of 6 subjects positive for e antibody; this difference was statistically significant ($p<0.002$). These data suggest that the replication of hepatitis B virus may be more active in liver tissues of e antigen-positive HBsAg carriers than in those who are e antibody-positive.

4417 IMMUNE RESPONSE TO HBsAg AND THE SPECTRUM OF LIVER LESIONS IN HBsAG-POSITIVE PATIENTS WITH CHRONIC RENAL DISEASE. (Eng.) Galbraith, R. M.; El Sheikh, N.; Portmann, B.; Eddleston, A. L. W. F.; Williams, R.; Parsons, V.; Bewick, M.; Ogg, C. S. (King's Coll. Hosp. Medical Sch., Denmark Hill, London SE5, England). *Br. Med. J.* 1(6024):1495-1497; 1976.

Liver dysfunction was studied in 15 hepatitis B surface antigen (HBsAg)-positive patients with chronic renal disease. The immune responses to HBsAg and the associated histological changes in six patients receiving immunosuppressive therapy after successful renal transplantation were compared with those in the remaining nine patients, who were maintained on hemodialysis or by dietary protein restriction alone. Evidence of chronic hepatitis was found on histological examination in 9 out of 15 patients. Cirrhosis had already developed in three patients, who deteriorated rapidly and died. Liver biopsies from the remaining 12 patients showed evidence of chronic aggressive hepatitis in 2, chronic persistent hepatitis in 4, and minor histological lesions in 6. There were no significant differences in the incidence of the various histological lesions between patients maintained on hemodialysis and transplant recipients. The persistence of HBsAg in patients with renal failure or in those receiving immunosuppressive drugs after a transplant must indicate some impairment of the normal immune response to hepatitis B viral antigens. Nevertheless, cellular or humoral immunity to HBsAg was detected in all eight patients with chronic hepatitis tested compared with only one out of five with minimal liver lesions, suggesting that the severity of the liver damage may be directly related to the degree of immunocompetence.

4418 EFFICACY OF HEPATITIS B IMMUNE SERUM GLOBULIN AFTER ACCIDENTAL EXPOSURE. PRELIMINARY REPORT OF THE VETERANS ADMINISTRATION COOPERATIVE STUDY. (Eng.) Seeff, L. B.; Wright, E. C.; Finkelstein, J. D.; Greenlee, H. B.; Hamilton, J.; Leevy, C. M.; Tamburro, C. H.; Vlahcevic, Z.; Zimmon, D. S.; Zimmerman, H. J.; Felsher, B. F.; Garcia-Pont, P.; Dietz, A. A.; Koff, R. S.; Kiernan, T.; Schiff, E. R.; Zemel, R.; Nath, N. (Veterans Admin. Hosp., 50 Irving St., N.W., Washington, DC 20422). *Lancet* 2(7942):939-941; 1975.

The efficacy of hepatitis B immune globulin (HBIG) in the prophylaxis of viral hepatitis was compared with that of immune serum globulin (ISG) in individuals accidentally exposed to material infectious for hepatitis. The study was a randomized, double-blind, controlled trial. A preliminary evaluation of the first 302 of the 561 participants indicated that HBIG significantly reduced the frequency of clinical and subclinical hepatitis. When the analysis was restricted to only those 263 patients exposed to hepatitis B surface antigen (HBsAg)-positive material, the frequency of hepatitis in the group that received an i.m. injection of 5 ml of HBIG with an anti-HBs titer of 1/100,000 was significantly lower (1/134) than that in the group that received ISG having an anti-HBs titer of less than 1/8 (8/129). An anti-HBs titer of above 1/4 was detected in 60% of the recipients of HBIG and in 9% of the recipients of ISG, 2 weeks after the initial injection. Less than 10% of HBIG recipients had detectable anti-HBs by the sixth month after the injection, suggesting that HBIG should be given every 3-4 months to continually exposed individuals.

4419 THE EFFECTS OF ACUTE INFECTIOUS HEPATITIS AND CIRRHOSIS OF THE LIVER ON THE NONERYTHROPOIETIC COMPONENT OF EARLY BILIRUBIN. (Eng.) Tarao, K.; Fukushima, K.; Endo, O.; Kamiyo, A. (3-46 Urahunecho ninami-ku, Yokohama 232, Japan). *J. Lab. Clin. Med.* 87(2):240-250; 1976.

The nonerythropoietic component of early labeled bilirubin in plasma and bile was studied in 7 patients with acute infectious hepatitis during the late convalescent stage, in 13 patients with Laennec-type liver cirrhosis, and in 7 control subjects after i.v. injection of a tracer dose (2.5 μCi) of 4-^{14}C-δ-aminolevulinic acid. All subjects were examined during the nonicteric stage. In control subjects, the mean cumulative radioactivity readings in 4 hr were $29 \pm 4.7 \times 10^3$ d.p.m./mg x 4 hr in plasma and $27.0 \pm 1.2 \times 10^3$ d.p.m./mg x 4 hr in bile. In acute infectious hepatitic patients, the mean cumulative radioactivity readings for both plasma and bile in 4 hr were approximately twice that found in control subjects. In mild cirrhotic patients with enlarged liver on scintigram, the mean cumulative radioactivity readings for both plasma and bile were approximately 1.4 times that in control subjects. In patients with more advanced cirrhosis and markedly small livers on scintigram, the mean cumulative radioactivity readings for both plasma and bile were as low as approximately 0.5 that of control subjects. These findings indicate the important role of the liver in the production of the nonerythropoietic component of early bilirubin in man.

4420 GUILLAIN-BARRE SYNDROME IN ACUTE HBsAg-POSITIVE HEPATITIS. (Eng.) Niermeijer, P.; Gips, C. H. (Univ. Hosp., Groningen, Netherlands). *Br. Med. J.* 4(5999):732-733; 1975.

The case of a 21-yr-old woman who developed the Guillain-Barre syndrome in association with hepatitis B is reported. Neurological symptoms developed on day 20 after hospitalization for

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hepatitis. The patient was, at this time, negative for hepatitis B surface antigen (HBsAg). Spinal fluid protein was raised to 1.8 g/l, and the respiratory musculature was affected, making assisted ventilation necessary on day 24. From day 28, the patient improved neurologically, and at this time HBsAg conversion, accompanied by proteinuria, became apparent. At day 63, she had become positive for antibody to HBsAg (anti-HB), while bilirubin and transaminases had become normal. The transient proteinuria concurring with the conversion to HBsAg seronegativity may have been due to deposition of HBsAg/anti-HBs immune complexes in the glomeruli.

4421 STUDY DESIGN FOR A HEPATITIS B VACCINE TRIAL. (Eng.) Lustbader, E. D.; London, W. T.; Blumberg, B. S. (Inst. Cancer Res., Fox Chase Cancer Center, Philadelphia, PA 19111). *Proc. Natl. Acad. Sci. USA* 73(3):955-959; 1976.

A short-time trial using a small sample of patients for the evaluation of the hepatitis B vaccine was designed and applied to 223 patients who had had at least one blood specimen tested for both HBsAg and anti-HBs. The premise was that antibody to the surface antigen of the hepatitis B virus is protective against viral infection. It was verified by using the presence of the surface antigen as the marker of infection and by comparing infection rates in renal dialysis patients who had a naturally-acquired antibody to patients without antibody. Patients with antibody had an extremely low risk of infection. The probability of remaining uninfected decreased at an exponential rate for patients without antibody, implying a constant risk of infection at any point in time. The model estimated that at 9 months, there was a 50% chance of remaining uninfected, while at 24 months the probability dropped to 15%. Of the 64 patients who entered the trial with anti-HBs, 3 subsequently developed HBsAg. Twelve of the 159 patients entering without anti-HBs or HBsAg made anti-HBs before having HBsAg, and none of these subsequently developed HBsAg. The disadvantages and possible advantages of becoming infected with hepatitis B virus have not yet been fully evaluated. The results argue in favor of artificially stimulating the immune system to prevent infection with hepatitis B virus.

4422 STEROID THERAPY IN SEVERE VIRAL HEPATITIS: A DOUBLE-BLIND, RANDOMIZED TRIAL OF METHYL-PREDNISOLONE VERSUS PLACEBO. (Eng.) Gregory, P. B.; Knauer, C. M.; Kempson, R. L.; Miller, R. (Stanford Univ. Medical Center, Room S069, Stanford, CA 94305). *N. Engl. J. Med.* 294(13):681-687; 1976.

The effect of corticosteroid therapy in viral hepatitis was studied in 29 patients with severe viral hepatitis who were randomly assigned to methyl-prednisolone or placebo treatment groups. Forty-eight milligrams were given p.o. or parenterally in divided doses for the first 4 weeks of the study; the dose was then tapered to a range of 32-40 mg for 2 weeks, 16-32 mg for 4 weeks, and 12-32 mg for the last 6 weeks of treatment. The patients were evaluated on the basis of duration of jaundice, liver size, total bilirubin, alkaline phosphatase, SGOT, albumin, gamma globulin, prothrombin time (percent of normal activity and sec > control), smooth muscle antibody, and hepatitis B surface antigen. The two groups were comparable in clinical findings, laboratory results and the presence of bridging necrosis on liver biopsy. Seven of the 14 patients assigned to methyl-prednisolone and two of the 15 assigned to placebo died during the 16-week study period. Although the apparent excess mortality in the steroid-treated patients was not quite statistically significant (p=0.08), the trend persisted when only patients positive for hepatitis B surface antigen (p=0.08) or those with bridging necrosis (p=0.04) were analyzed separately. It is concluded that methyl-prednisolone does not enhance survival in patients with severe viral hepatitis, and it may be detrimental.

4423 PARTICULARITIES OF THE CLINICAL COURSE OF EARLY LIVER CIRRHOSIS DEVELOPMENT IMMEDIATELY AFTER SERUM HEPATITIS. (Rus.) Bunin, K. V.; Pak, S. G.; Brodov, L. E.; Tsoi, D. M. (First Moscow Medical Inst., Moscow, USSR). *Ter. Arkh.* 47:12-15; 1975.

4424 BIOLOGICAL STUDY OF HEMOSTASIS IN THE COURSE OF BENIGN VIRAL HEPATITIS. (Fre.) Thabaut, A.; Laverdant, Ch.; Durosoir, J. L.; Cristau, P.; Essioux, H.; Moline, Cl. (Hopital d'Instruction des Armees Begin, 94160 St-Mande, France). *Med. Chir.* 4(4):203-209; 1975.

4425 EVOLUTION OF GAMMA-GLUTAMYL-TRANSPEPTIDASE DURING ACUTE VIRAL HEPATITIS: REPORT OF 130 CASES. (Fre.) Allard, P.; Girod, F.; Kassem, A.; Molinie, Cl.; Essioux, H.; Cristau, P.; Bon, R.; Laverdant, Ch. (H.I.A. Begin, 69, avenue de Paris, F 94160 Saint-Mande, France). *Med. Armees* 3(7):567-570; 1975.

4426 OSMOTIC FUNCTION OF THE KIDNEYS IN ADULTS WITH VIRAL HEPATITIS. (Pol.) Rychalska-Glanc, B. (Klinika Chorob Zakaznych AM, 01-201 Warsaw, Poland). *Pol. Tyg. Lek.* 30(50):2085-2088; 1975.

4427 STATUS REPORT ON INFECTIOUS HEPATITIS IN CHILDHOOD. (Ger.) Gudowski, G.; Tacke, A.; Wiegand, U. (Universitats-Kinderklinik der Charite, Humboldt-Universitat zu Berlin, Berlin, E. Germany). *Kinderaerztl. Prax.* 43(8):357-370; 1975.

4428 AUSTRALIA ANTIGEN IN PUNCTURE BIOPSY OF THE LIVER. (Cze.) Chlumska, A.; Dobias, J.; Chlumsky, J. (Fakulta higienicka University Karlovy, 100 34 Prague 10, Vinohrady, Srobarova 50, Czechoslovakia). *Cas. Lek. Cesk.* 114(45):1386-1389; 1975.

4429 STUDY OF HBAg SUBTYPES IN VIRAL HEPATITIS PATIENTS AND IN BLOOD DONORS WITH ANTIGENEMIA IN DIFFERENT TOWNS OF THE USSR. (Rus.) Barinskii, I. F.; Kantorovich, R. A.; Chimbru, V. I.; Reizis, A. R.; Semendiaeva, M. E.; Tsybuliak, S. N.; Rudenskaia, M. N.; Loris, N. Iu.; Stoliarova, G. A.; Bondarenko, M. P.; Tovstyko, O. I.; Troian, S. Ia.; Pogosian, N. Kh. (D. I. Ivanovskii Inst. Virology, USSR Acad. Medical Sciences, USSR). *Sov. Med.* (5): 112-115; 1975.

4430 SYSTEMATIC STUDY OF HEMOSTASIS IN ACUTE VIRAL HEPATITIS. (Por.) Chamone, D. A. F.; da Cunha, A. C.; de Oliveira e Silva, A.; Sette, H., Jr.; Pontes, J. F.; Raia, S.; da Silva, L. C. (Instituto Brasileiro de Estudos e Pesquisas de Gastroenterologia, Brazil). *Arq. Gastroenterol. Sao Paulo* 12(4):233-237; 1975.

4431 GIANT CELL HEPATITIS AND OCCLUSION OF BILE DUCT IN NEWBORN BABIES. TWO DIFFERENT SYNDROMES OR A SINGLE PATHOGENETIC ENTITY? (Ger.) Schweizer, P. (Chirurgische Univ.-Klinik, D-7400 Tubingen, Calwerstrasse 7, W. Germany). *Munch. Med. Wochenschr.* 117(45):1813-1814; 1975.

4432 ETIOLOGY AND PATHOGENESIS OF NEUROLOGICAL DISORDERS IN CHILDREN WITH ICTERIC VARIANT OF VIRAL HEPATITIS [Abstract]. (Rus.) Lekar', P. G.; Gol'zand, I. V.; Mishchenko, V. A. (Leningrad Inst. Hygiene and Medicine, Leningrad, USSR). *Pediatriia* (9):84; 1975.

4433 AUTOANTIBODIES AND HB ANTIGENEMIA IN CHRONIC PERSISTENT AND CHRONIC AGGRESSIVE HEPATITIS. (Pol.) Juszczyk, J.; Jarczewska, K.; Kiczka, W.; Adamek, J.; Panczyszak, M.; Zeromski, J. (Instytut Chorob Wewnetrznych, Ul. Wincentego 1, 61-003 Poznan, Poland). *Pol. Tyg. Lek.* 30(46):1905-1908; 1975.

4434 SUBTYPES AY AND AD OF HEPATITIS B ANTIGEN. (Spa.) Pedreira, J. D.; Martinez-Vazquez, J. M.; Guardia, J.; Pahissa, A.; Gallart, M. T.; Hernandez-Sanchez, J. M.; Vilaseca, J.; Bacardi, R.; Tornos, J. (Departamento de Medicina Interna, Ciudad Sanitaria de la Seguridad Social, Barcelona, Spain). *Med. Clin. (Barc.)* 64(1):9-10; 1975.

4435 EXPERIMENTAL VIRAL HEPATITIS. (Fre.) Kirn, A. (Groupe de Recherches de l'INSERM sur la Pathogenie des Infections Virales, 3, rue Koeberle, 67000 Strasbourg, France). *Ann. Gastroenterol. Hepatol.* 11(5):333-346; 1975.

4436 MORPHOLOGICAL CONFIRMATION OF THE MECHANISM OF HIGHER ACTIVITY OF ACID PHOSPHATASE IN THE BLOOD SERUM OF PATIENTS WITH VIRAL HEPATITIS. (Rus.) Drozd, T. N.; Luchshev, V. I.; Zaitsev, V. V.; Berezina, T. A. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Arkh. Patol.* 37(6): 66-71; 1975.

4437 STUDY OF SOME INDICES OF NITROUS METABOLISM IN CHRONIC VIRAL HEPATITIS. (Rus.) Mel'k, M. V. (Leningrad Inst. Pediatrics, Leningrad, USSR). *Klin. Med. (Mosk.)* 53(8):27-31; 1975.

4438 CLINICO-BIOCHEMICAL ASSESSMENT OF A THERAPEUTIC EFFECT OF VITOHEPATE IN ACUTE VIRAL HEPATITIS. (Rus.) Levina, L. D.; Ambalov, Iu. M.; Ostrovskaia, A. A. (Rostov Medical Inst., Rostov, USSR). *Arkh. Ter.* 47(8):62-66; 1975.

4439 FIBRINOLYTIC ACTIVITY OF THE BLOOD IN VIRAL HEPATITIS WITH ACUTE NECROSIS OF THE LIVER. (Rus.) Zhitar', V. D. (Kishinev Medical Inst., Kishinev, USSR). *Ter. Arkh.* 47(8):55-61; 1975.

4440 SOME INDICES OF NITROGEN METABOLISM IN PATIENTS WITH VIRAL HEPATITIS. (Rus.) Mel'k, M. V.; Shcheglova, S. A.; Volkova, Z. A.; Gundalakh, A. I. (Leningrad Inst. Pediatrics, Leningrad, USSR). *Ter. Arkh.* 47(8):66-71; 1975.

4441 VIRAL HEPATITIS AND PULMONARY TUBERCULOSIS. (Rus.) Agraval, P. D. (Lvov Medical Inst., Lvov, USSR). *Ter. Arkh.* 47(8):71-74; 1975.

4442 HYPERSENSITIVITY OF DELAYED TYPE AND AUSTRALIA ANTIGEN IN VIRAL LESIONS OF THE LIVER. (Rus.) Tareev, E. M.; Baroian, O. V.; Traianova, T. G.; Kantorovich, R. A.; Mazharov, M. K.; Semendiaeva, M. E.; Aprosina, Z. G. (I. M. Sechenov Moscow Medical Inst., Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* (6):3-9; 1975.

4443 COMPARATIVE ASSESSMENT OF THE EFFECT OF HEPARIN AND PREDNISOLONE ON THE ACTIVITY OF ALANINE AND ASPARTATE TRANSFERASE OF THE BLOOD SERUM OF PATIENTS WITH ACUTE VIRAL HEPATITIS. (Rus.) Fedianin, Iu. P. (Chita Medical Inst., Chita, USSR). *Ter. Arkh.* 47(8):75-77; 1975.

4444 DIAGNOSTIC SIGNIFICANCE OF SOME SPECIFIC HEPATIC ENZYMES AND ISOENZYMES IN VIRAL HEPATITIS. (Rus.) Andriutsa, K. A.; Gabarets, E. P. (Kishinev Medical Inst., Kishinev, USSR). *Ter. Arkh.* 47(8):78-81; 1975.

4445 SERUM HEPATITIS AND PEPTIC ULCER. (Rus.) Ugriumov, B. L.; Vovk, A. D.; Tat'ianko, N. V.; Iurkovskaia, N. B.; Vas'kovskaia, M. G. (Kiev Scientific Research Inst. Infectious Diseases, Ukrainian SSR Ministry Health, Kiev, USSR). *Vrach. Delo* (9):140-144; 1975.

See also, 4032, 4061, 4331, 4344, 4349, 4446, 4471.

LIVER AND BILIARY TRACT

Chronic Hepatitis

4446 DETECTION OF A LIVER-MEMBRANE AUTOANTIBODY IN HB_sAg-NEGATIVE CHRONIC ACTIVE HEPATITIS. (Eng.) Hopf, U.; Meyer zum Buschenfelde, K. -H.; Arnold, W. (II. Medizinische Klinik der Universitat, 6500 Mainz, W. Germany). *N. Engl. J. Med.* 294(11):578-582; 1976.

Humoral immunity against hepatocellular membrane antigens was investigated in 52 patients with chronic active hepatitis, 46 patients with acute viral hepatitis, 14 patients with chronic persistent hepatitis, 8 healthy carriers of hepatitis B surface antigen (HBsAg), 6 patients with alcoholic liver cirrhosis, and 10 normal controls. Two different immunofluorescence patterns of immunoglobulin G (IgG) were observed on hepatocyte membranes. The membrane-fixed IgG on hepatocytes from patients with HBsAg-negative hepatitis showed a linear membrane fluorescence, but HBsAg-positive cases and some cases of protracted acute hepatitis B had a granular pattern. In patients with IgG bound to hepatocytes, continuing necrosis of parenchymal liver cells was seen. Conversely, hepatocytes without bound IgG were found in cases of chronic active hepatitis in remission, acute viral hepatitis without HBsAg and chronic persistent hepatitis, in healthy HBsAg carriers, and in patients with fatty liver or alcoholic cirrhosis. A liver-membrane autoantibody in serum, proved by fixation on membranes of isolated rabbit hepatocytes, was demonstrated only in HBsAg-negative chronic active hepatitis with elevated IgG concentrations. The results support the theory that different pathogenetic types of chronic active hepatitis exist, a so-called autoimmune type and a hepatitis virus-B-induced type.

4447 ANTIBODIES TO SMOOTH MUSCULATURE IN CHRONIC LIVER DISEASES. (Rus.) Bondar', Z. A.; Speranskii, A. I.; Podymova, S. D.; Nasonov, E. L. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Ter. Arkh.* 47:15-19; 1975.

Sera from patients with chronic liver diseases and from 20 healthy blood donors were investigated for the presence of antibodies to smooth musculature by indirect immunofluorescence, using serum antigammaglobulin conjugated with fluorescein isothiocyanate. The subjects included 26 patients with chronic active hepatitis, 10 patients with primary biliary cirrhosis, 16 patients with Laennec's cirrhosis, 21 patients with mixed cirrhosis, 4 patients with persistent hepatitis, 11 patients with systemic lupus erythematosus, 3 patients with systemic scleroderma, 9 patients with rheumatoid arthritis, and 7 patients with other unspecified diseases. Antibodies to smooth musculature were found in 54% of the patients with chronic active hepatitis, in 30% of the patients with primary biliary cirrhosis, in 6% of the patients with Laennec's cirrhosis, in 38% of the patients with mixed cirrhosis, and in 1% of the patients with unspecified diseases. No antibodies were found in serum samples from patients with persistant hepatitis, systemic lupus erythematosus, systemic scleroderma, rheumatoid arthritis, or in the healthy donors. The incidence of high antibody titers (>1:128) was highest in chronic active hepatitis and lowest in primary biliary cirrhosis. The findings indicate the value of the determination of serum antibodies to smooth musculature in the diagnosis of chronic active hepatitis.

4448 IMMUNOSUPPRESSIVE THERAPY AND VIRUS-CORES IN HBAg-POSITIVE CHRONIC HEPATITIS. (Eng.) Kendrey, G.; Szalka, A.; Laszlo, B.; Binder, L.; Hollos, I. (Zentral-Infektionsspital, d. Stadt, Budapest, Hungary). *Klin. Wochenschr.* 53(22):1081-1082; 1975.

Liver biopsies were carried out in a 38-yr-old woman before and during 6 months of immunosuppressive therapy (azathioprine, 50 mg/kg/day) for chronic active hepatitis and persistent hepatitis B (HB) antigenemia. Before the onset of therapy, virus cores were not detected by electron microscopy in the liver cell nuclei. Two biopsies taken during therapy showed intranuclear, ring-shaped virus-cores of 20 to 25 nm diameter in almost every hepatocyte. It has been previously suggested that similar cores might be the virus responsible for viral hepatitis.

4449 TWO IMMUNOLOGIC REACTIONS IN THE PATHOGENESIS OF HEPATITIS? (Eng.) Paronetto, F.; Popper, H. (Veterans Admin. Hosp., Bronx, New York, NY). *N. Engl. J. Med.* 294(11):606-607; 1976.

The possibility of two immunologic reactions being responsible for the chronicity of hepatitis is discussed. These two pathogenetic mechanisms are an immune reaction against viral products, and an autoimmune aggression that initiates or perpetuates liver-cell injury. The first mechanism is based on the discovery of Australia or hepatitis B-associated antigen (HBsAg) with the separation of the surface components (s) from the core (c). Various studies have suggested that elimination of antigen-carrying cells or suppression of the expression of the virus (which is based on the formation of both c and s) results in healing, whereas inadequate elimination explains chronicity. The second mechanism rests on the identification of a liver-specific antigen, which might be the target of an autoimmune attack. Other studies have shown that there are different types of gamma globulin deposition on the membranes of isolated hepatocytes, depending upon whether the patient is HBsAg-positive or -negative. These data support the theory of a dual origin of chronic hepatitis and incriminate different pathogenetic processes in HBsAg-positive and HBsAg-negative viral hepatitis. It is suggested that certain immune processes account for hepatocellular necrosis and chronicity of viral hepatitis, and that while some cases of HBsAg-negative hepatitis are primarily autoimmune disorders, in HBsAg-positive hepatitis cases, autoimmune aggression has only a supplemental role.

4450 PROGNOSIS OF CHRONIC HEPATITIS IN CHILDREN. (Cze.) Lukes, J.; Lukesova, M.; Zavazal, V. (Lekarska fakulta University Karlovy, 305 99 Plzen, Marxova 13, Czechoslovakia). *Cas. Lek. Cesk.* 114(36):1112-1115; 1975.

See also, 4331, 4416, 4442, 4459.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

4451 INABILITY OF CHRONIC ALCOHOLICS WITH LIVER DISEASE TO USE FOOD AS A SOURCE OF FOLATES, THIAMIN AND VITAMIN B$_6$. (Eng.) Baker, H.; Frank, O.; Zetterman, R. K.; Rajan, K. S.; ten Hove, W.; Leevy, C. M. (New Jersey Medical Sch., 88 Ross St., East Orange, NJ 07018). *Am. J. Clin. Nutr.* 28(12): 1377-1380; 1975.

The absorption of folates, thiamin, vitamin B$_6$, pantothenate, and riboflavin derived from yeast, and their respective synthetic forms was studied in 37 patients with liver disease due to alcoholism and in 12 healthy nonalcoholic subjects. The absorption of the vitamins was measured before, 2 hr after, and 5 hr after ingesting 35 g of brewer's yeast; 1 week later, the absorption test was repeated using the same concentrations of synthetic vitamins present as natural vitamins in yeast, i.e., 1.9 mg folylmonoglutamate, 21 mg thiamin HCl, 14 mg pyridoxine HCl (vitamin B$_6$), 7 mg riboflavin, and 210 mg calcium pantothenate. Patients with alcoholic liver disease had a mean peak increment (Δ, i.e., the difference in value between heights of plasma and whole blood vitamin activity before and after yeast or synthetic vitamins) for pantothenate (328 and 251 ng/ml after yeast and after synthetic vitamins, resp.) and for riboflavin (107 and 146 ng/ml, resp.) similar to that of healthy subjects (pantothenate: 258 and 219 ng/ml, resp.; riboflavin: 71 and 193 ng/ml, resp.). In contrast, the Δ for thiamin and vitamin B$_6$ was significantly depressed (4 and 37 ng/ml, resp.) after ingesting yeast in comparison to controls (10 and 71 ng/ml, resp.). Healthy controls had a mean Δ for folate of 34.6 ng/ml after ingesting yeast, while that for the alcoholics was only 5.1 ng/ml; however the Δ for folate increased to 49.0 ng/ml in the alcoholics after ingesting synthetic folylmonoglutamate (control value=32.8 ng/ml). One ml of plasma from alcoholics or controls increased the folate activity present in 1.0 mg of yeast from 0.5 ng (untreated with plasma) to 64 ng (treated with plasma as a source of folate conjugase); the plasma from healthy subjects and the alcoholics contained comparable folate conjugase activity. The folate, vitamin B$_6$, and thiamin deficits common in alcoholic liver disease probably result from the inability to absorb these specific vitamins from foods.

4452 SALIVARY STUDIES IN ALCOHOLIC CIRRHOSIS. (Eng.) Abelson, D. C.; Mandel, I. D.; Karmiol, M. (Sch. Dental Oral Surgery, Columbia Univ., 630 West 168th St., New York, NY 10032). *Oral Surg. Oral Med. Oral Pathol.* 41(2):188-192; 1976.

The composition of parotid saliva and the incidence of enlargement of this gland were determined in 18 patients with alcoholic cirrhosis and in 18 age- and sex-matched controls. Sodium, potassium, and calcium concentrations were determined in saliva samples by atomic absorption spectrophotometry. Parotid enlargements, usually bilateral, were observed in 11 of the 18 patients. Flow rate, potassium concentration, and calcium concentrations in the cirrhotic patients (1.3 ml/min, 24.6 mEq/l, and 2.9 mEq/l, resp.) were significantly elevated ($p<0.005$) over those of the controls (0.7 ml/min, 21.1 mEq/l, and 2.9 mEq/l, resp.). There were significant elevations of both total protein and amylase ($p<0.005$) in the cirrhotic group (355 mg% total protein in cirrhotic group versus 198 mg% in controls and 2,571 U/ml amylase in cirrhotics versus 1,267 U/ml in controls). Immunoglobulins G, M, and A, determined by immunodiffusion, were normal in both groups. Although the sodium concentration was also elevated in the cirrhotic patients, the output was actually lower than normal when the flow rate relation was considered. The increased flow rate and elevated protein and amylase levels indicate that hypertrophy and increased acinar function are components of the parotid enlargement commonly seen in alcoholic cirrhosis.

4453 PLATELET AGGREGATION IN PORTAL CIRRHOSIS. (Eng.) Ballard, H. S.; Marcus, A. J. (New York Veterans Admin. Hosp., 408 First Ave., New York, NY 10010). *Arch. Intern. Med.* 136(3):316-319; 1976.

Primary and secondary platelet aggregation in response to ADP$_1$ was studied in 24 alcoholic patients with portal (Laennec) cirrhosis and was compared with platelet aggregation in 14 normal subjects. In 12 patients with cirrhosis, platelet aggregation was diminished when compared to controls

Of the patients with impaired aggregation, 6 had elevated levels of fibrinogen-fibrin degradation products (FDP's, >8 μg/ml), 11 had thrombocytopenia (platelet counts ranged between 57,000 and 185,000 ml^3), 10 had shortened euglobulin lysis times (complete lysis within 90 min; controls, >1.5 hr), 4 had hypofibrinogenemia (79-198 mg fibrinogen/100 ml), and all had prolonged thrombin clotting times (>18 sec). The data suggest that elevated levels of serum FDP's do not explain fully the impairment of platelet aggregation or the prolongation of the thrombin clotting time that was noted in patients with advanced liver disease. A possible explanation for the prolongation of the thrombin clotting time is the presence of "altered" plasma fibrinogen.

4454 RELATION BETWEEN HEPATIC ALCOHOL DEHYDROGENASE ACTIVITY AND THE ASCORBIC ACID IN LEUCOCYTES OF PATIENTS WITH LIVER DISEASE. (Eng.) Dow, J.; Krasner, N.; Goldberg, A. (Stobhill General Hosp., Glasgow G21 3UW, Scotland). *Clin. Sci. Mol. Med.* 49(6):603-608; 1975.

Hepatic alcohol dehydrogenase activity and leukocyte ascorbic acid content were measured in 35 patients with liver disease and in 10 control subjects with duodenal ulcer. The patients with liver disease were divided into three groups consisting of 10 nondrinkers, 10 moderate drinkers (persons consuming over 4 pints of beer or equivalent more than 4 times per week), and 15 alcoholic/heavy drinkers. There was no significant difference in hepatic alcohol dehydrogenase activity between the groups with liver disease, but all patients had less than half the hepatic alcohol dehydrogenase activity of the control subjects (p<0.001). The ascorbic acid in leukocytes was significantly lower in the alcoholic/heavy drinker group (0.9 ± 0.5 fmol/cell) than that in the control subjects (1.4 ± 0.4, p<0.02) when the Student's *t*-test was applied, but no significant difference was found when the Mann-Whitney *U*-test was used. A correlation coefficient of r=0.77 (p<0.001) was observed among the 35 patients with liver disease when hepatic alcohol dehydrogenase activity was compared with leukocyte ascorbic acid content. An insignificant correlation (r=0.332) was found in the control subjects with no liver disease. This comparison was also significant among non-drinkers with liver disease (r=0.873, p<0.001), moderate drinkers (r=0.739, p<0.02) and alcoholic/heavy drinkers (r=0.702, p<0.005). The addition of ascorbic acid *in vitro* (0.5-10 mM) had no effect on the activity of alcohol dehydrogenase. The relation between hepatic alcohol dehydrogenase activity and leukocyte ascorbic acid content is probably a consequence of liver disease, as opposed to any specific effect of ascorbic acid deficiency or alcohol consumption on alcohol dehydrogenase activity.

4455 BIOCHEMICAL ASPECTS OF FATTY LIVER. (Ger.) Groezinger, K.-H. (Stadttisches Krankenhaus, Dhunnberg 60, D-509 Leverkusen, W. Germany). *Helv. Chir. Acta* 42(1/2):89-91; 1975.

4456 EARLY DIAGNOSIS OF FIBROUS HEPATIC LESIONS IN CHRONIC ALCOHOLICS. (Fre.) Berthet, P.; Bel, A.; Girard, M. (Hopital de la Croix Rousse, 93, Grande Rue de la Croix Rousse, 69317 Lyon Cedex 1, France). *Ann. Gastroenterol. Hepatol.* 11(5):347-364; 1975.

4457 ENZYME CHEMICAL CHARACTERISTICS OF ALCOHOL LIVER IN MAN AND EXPERIMENTAL ANIMALS. (Rus.) Mukhin, A. S.; Lebedev, S. P.; Gurtovenko, V. M.; Urakov, I. G. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* (6):56-59; 1975.

4458 A SIMPLE TEST FOR PATENCY OF PORTACAVAL SHUNTS [Abstract]. (Eng.) Davies, T. F.; Prudhoe, K.; Douglas, A. P. (Royal Victoria Infirmary, Newcastle upon Tyne, England). *Gut* 16(10):827-828; 1975.

See also, 3864, 4419.

LIVER AND BILIARY TRACT

Cirrhosis

4459 PRELIMINARY STUDY OF HEPATIC MICROSOMAL ENZYMES BEHAVIOR IN NORMAL AND CIRRHOTIC INDIVIDUALS. (Spa.) Escartin Marin, P.; Rossi, I.; Garcia Plaza, A.; Diaz Gil, J. J.; Gonsalves, M. (Centro Nacional de Investigaciones Medico-Quirurgicas de la Seguridad Social, Clinica Puerta de Hierro). *Rev. Clin. Esp.* 136(6):499-506; 1975.

The function of microsomal hepatic enzyme activity in cirrhotic subjects was investigated by determining the urinary D-glucaric acid excretion under normal conditions and after enzyme induction with phenobarbital. The b5 and P-450 microsomal cytochrome levels were also determined. Under normal conditions, the average D-glucaric acid excretion (evaluated as μM of glucaro-1, 4-lactone) in 20 patients with cirrhosis of the liver was slightly higher (7.1 μM) than in 20 control subjects (5.0 μM) without liver disease or previous exposure to drugs. This increase was attributed to the enzyme inducing action of alcohol, since all the patients had alcoholic cirrhosis and were drinking up to the time of hospitalization. The administration of phenobarbital (200 mg/d x 7) increased the average D-glucaric acid excretion by 8.8 μM in the controls, versus an increase of only 4.25 μM in the cirrhotic patients. Five patients showed no enzyme induction response. The concentrations of b5 and P-450 cytochromes (evaluated in M of microsomal pigments/mg of microsomal protein) were approximately 50% lower in six patients with advanced cirrhosis of the liver than in three patients with chronic hepatitis and in six healthy controls. The authors suggest that lower tolerance of drugs in patients with advanced parenchymal liver diseases may be partially caused by alterations of the microsomal enzymes.

4460 CYTOMORPHOLOGICAL STAINING OF NEEDLE BIOPSIES FROM CIRRHOTIC LIVER. (Cro.)

Rajcic, V. (Military Hosp., Zagreb, Yugoslavia). *Vojnosanit. Pregl.* 32(2):138-141; 1975.

Fifty stainings of needle biopsies from cirrhotic liver and 50 stainings of biopsies from normal liver were analyzed to determine whether there were morphological changes that were sufficiently characteristic to serve as the basis for establishing criteria for liver cirrhosis from cytological compounds. Moderate to pronounced morphological atypia of the hepatocyte nuclei were found in 45/50 cases of cirrhosis, while the findings were normal in 48/50 controls. All cytoplasms showed morphological atypia, while 44/50 controls had normal cytoplasm. Slight to pronounced vacuolization of the hepatocytes was observed in 30/50 cases of cirrhosis, but only slight vacuolization was found in 3/50 controls. Large to very large numbers of biliary epithelium cells were found in the smears of 47/50 cirrhotic cases, and only a small number of such cells was found in 11/50 control biopsies. Hypocellularity of the needle biopsy material, pleomorphism and vacuolization of the hepatocytes, and the presence of large numbers of biliary epithelium cells are the cytomorphological atypia which can be used for the diagnosis of liver cirrhosis.

4461 AN IMPROVED CHOLEDOCHOFIBERSCOPE AND NONSURGICAL REMOVAL OF RETAINED BILIARY CALCULI UNDER DIRECT VISUAL CONTROL.

(Eng.) Yamakawa, T.; Mieno, K.; Nogucki, T.; Shikata, J. (Sch. Medicine, Teikyo Univ., 2-11-1, Kaga, Itabashi-ku, Tokyo 173, Japan). *Gastrointest. Endosc.* 22(3): 160-164; 1976.

Experience with 126 operative and postoperative choledochoscopic examinations using an improved fiberoptic instrument is reported. The examinations were performed on 48 patients. The improved choledochofiberscope is 580 mm long and has a 250-mm flexible distal tip; there is no twisting torque between the proximal part and the distal end because the flexible part is shorter than a conventional choledochofiberscope. Retained stones in the bile ducts were found in 7 of the 29 cases surgically explored for calculous biliary tract disease. All stones were removed nonsurgically by visually guided and controlled instruments. In two of the seven cases, both operative and postoperative choledochoscopy were carried out; in the remaining cases only postoperative choledochoscopy was performed. Two of the seven cases, that of a 59-yr-old man who underwent surgery for cholecystolithiasis and choledocholithiasis and that of a 73-yr-old man who underwent cholecystectomy for cholecystitis and choledocholithiasis, are described in detail. Eight retained stones were revealed in the common hepatic and common bile ducts of the first patient by choledochoscopy and by a T-tube cholangiogram (performed 3 weeks after surgery). In the second patient, T-tube cholangiograms revealed small radiolucent defects throughout the biliary tract; choledochoscopy revealed two small cholesterol stones in the common bile duct. The stones were removed from both patients with a balloon-tipped catheter and basket forceps. The main value of choledochoscopy lies in the fact that retained or unsuspected stones, once their presence and positions are known, are usually readily removed with endoscopically-guided instruments

4462 THE FAILURE OF INTRA-ARTERIAL PITRESSIN INFUSION TO CONTROL UPPER GASTRO-INTESTINAL BLEEDING IN CIRRHOTIC PATIENTS.

(Eng.) MacKenzie, R. L.; Bury, K. D.; Provan, J. L.; St. Louis, E.; Marcon, N. (Wellesley Hosp. and Univ. Toronto, Toronto, Ontario, Canada). *J. Surg. Res.* 20(5): 505-508; 1976.

Experience with 24 cirrhotic patients in whom intra-arterial Pitressin (vasopressin) infusion was used in an attempt to control massive upper gastrointestinal bleeding is presented. Eight patients were bleeding from esophageal varices, 15 from gastric erosions, and 1 from both gastric erosions and esophageal varices. Pitressin (200 U) was added to 1 liter of either normal saline or 5% dextrose in water and was infused into the femoral artery at a maximum rate of 45 ml/hr (0.2 U/ml/min). Complete control of bleeding was obtained in only five patients. Twelve patients showed an initial response to Pitressin infusion but rebled at least once. No control of bleeding was achieved in seven patients. There were only four survivors in the entire group, two in the group where control was achieved and one each in the two latter groups. Complications of catheter placement arose in five patients, and these included ischemia of the ipsilateral leg, bleeding around the catheter, and ipsilateral thrombophlebitis. It appears that Pitressin infusion is of little value in the treatment of gastrointestinal bleeding in cirrhotic patients.

4463 THE EFFECT OF PROGESTERONE IN CIRRHOSIS.

(Eng.) Dinc, I.; Barlas, O.; Baban, N.; Baykut, F.; Oktay, E. (Cerrahpasa Faculty Medicine, Univ. Istanbul, Cerrahpasa, Istanbul, Turkey). *Med. Bull. Istanbul Univ.* 8(1):94-98; 1975.

Serum potassium, sodium, and sodium chloride concentrations, and the excretion of these substances and of aldosterone in 24-hr urine samples were determined in 10 cirrhotic patients (9 men and 1 woman) before and after treatment with progesterone (50-100 mg/day, i.m.). Treatment consisted of progesterone and dexamethasone, of progesterone and chlorothiazide, or of all three drugs. Gynecomastia disappeared after progesterone treatment in six patients, probably because of the anti-estrogenic action of progesterone. Following progesterone treatment, diuresis occurred in all patients, together with a significant increase in serum potassium and decreases in serum sodium and sodium chloride, indicating that progesterone has anti-aldosteronic properties.

4464 RESORPTIVE CAPACITY OF THE SMALL INTESTINE IN PORTAL HYPERTENSION. (Rus.) Lytkin, M. I.; Eremenko, V. P. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Klin. Med.* 53(10):90-95; 1975.

Small intestinal resorption of radioactivity labeled oleic acid, trioleate-glycerin, glucose, D-xylose, and albumin was studied 1-9 hr after administration in 104 patients with portal hypertension and liver cirrhosis (group 1), in 32 patients with extrahepatic portal hypertension without liver cirrhosis (group 2), and in 26 patients in whom decompression of the portal system was performed by splenorenal or mesentericocaval anastomosis for either form of portal hypertension (group 3). Considerable depression of resorption was found in either type of portal hypertension; the resorption of fatty acids and of the decomposition products of neutral fat was suppressed the most. Steatorrhea following the administration of neutral fat was more pronounced in group 1 than in group 2, indicating that the assimilation of neutral fat in liver cirrhosis is due to reduced resorption and to disorders of the hydrolytic processes, which result as a consequence of exocrine insufficiency of the pancreas. These changes were not correlated with the duration of the disease or with the value of the portal pressure. The glucose resorption was reduced in 79 of 100 patients in group 1 and in 22 of 30 patients in group 2. Similar findings were obtained for D-xylose. The reduction of the carbohydrate resorption was due to disturbances in active resorption and in the transport processes. The absence of changes in the protein resorption indicates that the dysproteinemia and hypoproteinemia of cirrhotic patients is basically due to disturbances in the protein synthesizing function of the liver and reticuloendothelial system rather than to disturbances in resorption from the small intestine. Normalization or improvement of the resorptive function of the small intestine was observed in group 3, 30-45 days after surgery.

4465 TREATMENT OF PORTAL HYPERTENSION. (Fre.) Mosimann, R. (Hopital cantonal universitaire, CH-1011 Lausanne, Switzerland). *Helv. Chir. Acta* 42(1/2):267-285; 1975.

4466 PORTAL HYPERTENSION. (Fre.) Magnenat, P. (Hopital Nestle, CH-1011 Lausanne, Switzerland). *Helv. Chir. Acta* 42(1/2):255-266; 1975.

4467 RESULTS OF TREATMENT OF PERSISTENT CIRRHOTIC ASCITES BY PUNCTURE-CONCENTRATION-REINJECTION. (Fre.) Fouet, P.; Conte, M.; Licht, H.; Bodin, F.; Denez, B.; Zimmermann, P. (Hopital Albert Chenevier, rue de Mesly, 94010 Creteil, France). *Sem. Hop. Ther.* 51(5/6):341-344; 1975.

4468 TREATMENT OF ASCITES IN HEPATIC CIRRHOSIS. (Spa.) Franquelo Ramos, E.; Huelin Benitez, J.; Franquelo Villalonga, E. (Hospital Civil Provincial de Malaga, Malaga, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(5):605-610; 1976.

4469 SURGICAL COMPLICATIONS IN CIRRHOTIC PATIENTS. (Fre.) Guisan, Y.; Enderlin, F.; Mihatsch, M.; Fahrlander, H. (Inselspital, CH-3000 Berne, Switzerland). *Helv. Chir. Acta* 42(1/2):241-244; 1975.

4470 THE PRECIPITATION FACTORS OF EXOGENOUS HEPATIC COMA. (Rum.) Mardare, G.; Lungu, I.; Pandele, G.; Zubcu, M. (Institutul de Medicina si farmacie, Iasi, Romania). *Rev. Med. Chir.* 78(4):799-808; 1974.

4471 HEPATOMA. (Fre.) Saigot, T.; Bousquet, O.; Sarrazin, A. (Hopital de la Salpetriere, 75013 Paris, France). *Rev. Med. Clin.* 6(12):781-784; 1975.

4472 STUDY OF THE FREQUENCY AND MORPHOLOGY OF METABOLIC CIRRHOSIS IN INFANCY AND CHILDHOOD. I. METABOLIC CIRRHOSES. (Ger.) Roschlau, G. (Institut der Medizinischen Akademie, Carl Gustav Carus, Dresden, E. Germany). *Zentralbl. Allg. Pathol.* 118(5):409-418; 1974.

4473 STUDY OF THE FREQUENCY AND MORPHOLOGY OF CIRRHOSIS IN INFANCY AND CHILDHOOD. II. BILIARY AND HEPATIC CIRRHOSIS. (Ger.) Roschlau, G. (Institut der Medizinischen Akademie, Carl Gustav Carus, Dresden, E. Germany). *Zentralbl. Allg. Pathol.* 118(5):419-431; 1974.

4474 HYPOXEMIA AND HEPATIC CIRRHOSIS. REVIEW OF THE LITERATURE. (Fre.) Debongnie, J. C. (Institut Dr. G. Therasse, B-5180 Godinne, Belgium). *Acta Tuberc. Pneumol. Belg.* 65(5):478-491; 1974.

4475 ETIOLOGY OF LIVER CIRRHOSIS. (Ger.) Thaler, H. (Wilhelminenspital, Montleartstrasse 37, A-1171 Vienna, Austria). *Therapiewoche* 26(5):607-614; 1976.

4476 STEATORRHEA AND LIVER CIRRHOSIS: A CRITICAL REVIEW. (Spa.) Duro, M. A. G.; Collel, J. E. E.; Puges, A. M. G.; Bullich, J. P.; Aguilar, M. L. G.; Mostaza, C. P. (Hospital Clinico y Provincial, Universidad de Barcelona, Barcelona, Spain). *Rev. Clin. Esp.* 137(6):489-496; 1975.

See also, 4054, 4064, 4087, 4220, 4344, 4423, 4447, 4539.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

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4477 KINETIC ANALYSIS OF BILIARY LIPID EXCRETION IN MAN AND DOG. (Eng.) Wagner, C. I.; Trotman, B. W.; Soloway, R. D. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA 19104). *J. Clin. Invest.* 57(2):473-477; 1976.

The rates of biliary excretion of bile salts, cholesterol, and phospholipids were measured in man and dog to clarify the mechanisms involved in biliary lipid excretion, and to evaluate their role in cholesterol gallstone formation. Seven cholecystectomized patients with balloon-occludable reinfusion T-tubes were studied during intact and interrupted enterohepatic circulation and four cholecystectomized dogs were studied during interrupted enterohepatic circulation. In man and dog, both cholesterol and phospholipid outputs were hyperbolically related to bile salt output by the equation $y=x(a + bx)$. The output curves intersected the origin and showed an initial rapid rise, followed by a slower increase to a minimum, suggesting a rate-limited mechanism. The shape of the curves permitted calculation of the theoretical maximal outputs and the rates of rise to those outputs. Comparison of these values showed that in both man and dog, phospholipid output was greater than cholesterol output and that cholesterol and phospholipid were excreted at different rates. These studies indicate that cholesterol, phospholipids, and bile salts are not excreted in a fixed relation. In addition, the usefulness of the derived theoretical maximal lipid output and the rate of rise of lipid excretion to a maximum in evaluating the kinetics of biliary lipid excretion was demonstrated.

4478 GALLBLADDER DISEASE IN CHILDREN AND ADOLESCENTS. (Eng.) Andrassy, R. J.; Treadwell, T. A.; Ratner, I. A.; Buckley, C. J. (Wilford Hall USAF Medical Center, Lackland Air Force Base, TX 78236). *Am. J. Surg.* 132(1):19-21; 1976.

A review of 79 patients, 20 yr old or younger, who underwent cholecystectomy for gallbladder disease during a 5-yr period is presented. Particular emphasis was placed on duration of symptoms, etiology and associated illness. There were 69 female patients, 38 of whom were parous. Forty-one patients were overweight. Sixty-eight patients presented with epigastric or right upper quadrant pain; other frequent symptoms included intolerance to fatty food, nausea and vomiting, and bloating. All five black patients had hemoglobinopathies, although this was not seen in any of the other patients. Four of these patients had the sickle cell trait. Of the 10 patients who did not have stones, 2 had cholesterosis and 2 had subacute cholecystitis. Perforation of the common duct at the junction of the cystic duct, choledochal cyst, pancreatitis, and a positive culture for coagulase-negative staphylococcus were found in one patient each, and cultures revealed *Salmonella typhosa* in two additional patients. Oral cholecystograms were a safe and reliable method of diagnosis in 41 of 69 patients tested. Management consisted of cholecystectomy with drainage in all cases. This procedure was associated with no mortality and with 15 complications; these included 4 urinary infections, 2 upper gastrointestinal bleeding episodes, 2 wound infections, 1 case of phlebitis, 1 subhepatic abscess, 3 instances of atelectasis and fever, and 2 cases of unexplained fever. Cholecystitis should be considered early in the child or adolescent with unexplained abdominal pain.

4479 COMPARATIVE BILIARY CONCENTRATIONS OF CEPHAZOLIN AND CEPHALOTHIN IN PATIENTS WITH BILIARY TRACT DISEASE. (Eng.) Madhavan, T.; Block, M.; Quinn, E. L.; Cox, F.; Fisher, E. J.; Burch, K. H.; Haas, E. J. (Henry Ford Hosp., Detroit, MI). *Scott. Med. J.* 20(5):255-258; 1975.

The concentrations of cephazolin and cephalothin were measured in the bile and gallbladder tissue of 24 patients who were given one of the drugs prior to cholecystectomy. These levels were compared with those in the serum. Eight patients were given 1 g of cephazolin i.m., eight were given 1 g of cephazolin i.v., and eight received 1 g of cephalothin i.v. The antibiotics in the bile were determined by a modified cup-plate method using *Bacillus subtilis* as the test organism. The gallbladder contained less than 3 μg/ml cephazolin in four patients given the i.m. dose, and 7-42 μg/ml in the four other patients. The cephazolin concentration in the bile after i.v. administration was 18-195 μg/ml, or up to eight times the simultaneous serum level. The cephalothin level in the bile ranged from 4 to 20 μg/ml or 1.5-5 times the simultaneous serum concentration. The tissue levels of cephazolin following the i.v. dose ranged from 20 to 100 μg/g tissue, in comparison to only 1-4 μg/g tissue of cephalothin. The mean cephazolin concentration was 58.2 μg/g. The tissue cephazolin levels were similar to the peak serum levels, but cephalothin tissue levels were 3-20 times less than the peak serum concentration. The concentration of cephazolin in the common duct bile following the i.m. administration was higher than that in the serum, and ranged from 33 to 58 μg/ml 1 hr after dosing and 80-129 μg/ml at 2-2.5 hr. The total cephazolin concentration in the T-tube bile in one patient given 1 g, i.m., every 6 hr (9 doses) was 0.19% of the administered dose. The bile concentration rose after the serum level fell, indicating that the biliary excretion curve lagged behind the serum concentration curve. These studies indicate that the concentration of cephazolin in the serum, bile, and gallbladder tissue are considerably higher than that of cephalothin, especially with i.v. administration. These concentrations are in excess of the usual minimal inhibitory concentration for organisms associated with cholecystitis, and cephalozolin should thus be a useful antibiotic in gallbladder surgery.

4480 ENDOSCOPIC RETROGRADE BRUSH CYTOLOGY (ERBC) OF THE BILIARY AND PANCREATIC DUCTS.

(Eng.) Osnes, M.; Serck-Hanssen, A.; Myren, J. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 10(8):829-831; 1975.

The use of a new device for cannulation of the papilla of Vater is reported. It has a brushing tube that can be introduced through the biopsy channel of the duodenoscope (Olympus JF B). In 17 patients in whom endoscopic retrograde cholangiopancreatography (ERCP) had demonstrated ductal abnormalities, an endoscopic retrograde brush cytology (ERBC) was performed. A cytological diagnosis of malignancy was made in eight patients and a possible malignancy in two cases. Seven cases were operated upon, and a malignant tumor was found in six of these cases. In one case, a malignant tumor was found at autopsy. Histological examination was performed in six cases and showed adenocarcinoma in all. Two patients with malignant cells and ERCP-findings of suspected pancreatic carcinoma were not operated upon. The tumors were localized to the papilla of Vater in one case, to the biliary duct in two, to the pancreatic head in four, and to the pancreatic corpus in two cases. No complications occurred in any of the cases. It is concluded that this technique provides information supplementary to that of other diagnostic procedures.

4481 TRANSCYSTIC DUCT OPERATIVE CHOLANGIOGRAPHY: PERSONAL EXPERIENCE WITH 500 CONSECUTIVE CASES.

(Eng.) Farha, G. J.; Pearson, R. N. (Wichita State Univ. Branch, Univ. Kansas Sch. Medicine, Wichita, KS). *Am. J. Surg.* 131(2): 228-231; 1976.

A comparative study of the routine use of operative cholangiography was undertaken in 500 patients to determine the efficacy of the procedure in all cholecystectomies and to assess its accuracy when compared with clinical criteria. Of the cholecystectomy patients, 69 had clinical indications for common bile duct exploration, and 29 of these yielded stones for an overall accuracy rate of 42%. Of the 431 remaining patients, 36 demonstrated abnormal cholangiograms and in these, 26 yielded stones within the common duct, representing an incidence of 6% of unsuspected stones. Of the 500 patients, 61 showed cholangiographic indications for common duct exploration and 50 were positive for stones for an overall accuracy of 82%. The overall incidence of common duct stone recovery was 11%. Transcystic duct operative cholangiography should be performed routinely during cholecystectomy.

4482 OPERATIVE CHOLANGIOGRAPHY: CRITERIA WHICH MAKE EXPLORATION OF THE COMMON BILE DUCT DESIRABLE.

(Eng.) Marks, C. G.; Kelvin, F. M. (Radcliffe Infirmary, Oxford, England). *Br. J. Surg.* 63(1):51-54; 1976.

A previously reported set of criteria that make exploration of the common bile duct desirable was evaluated in 92 patients who underwent operative cholangiography. The overall accuracy of operative cholangiography in predicting stones in the common bile duct was 89%. The most reliable criteria in the diagnosis of the 40 patients who had calculi were: the presence of filling defect(s) in the common bile duct, which were present in 39 of 40 patients with calculi and in only 1 of the 52 normal patients; the absence of free flow of contrast medium into the duodenum, measured by the length of duodenum filled, which was present in 37 patients with calculi and in 5 normal patients, when a length of <2 cm was considered abnormal, and in 32 patients with calculi and 7 normal patients, when <7 cm was considered abnormal; and an abnormality of the terminal segment which was present in 35 patients with calculi and 6 normal patients. In 34 of the 40 positive explorations, the common bile duct diameter was 14 mm or less; 10 common bile ducts that contained stones were less than 10 mm in diameter. Excess filling of the intrahepatic ducts was often impossible to judge in the group with calculi, and was the least valuable criterion (present in 33 patients with calculi and 1 normal patient). The combination of filling defect(s) in the common bile duct and no free flow into the duodenum was the most accurate diagnostic combination, being positive in 92.5% of the 40 patients with calculi.

4483 A COMPARISON OF OPERATIVE CHOLANGIOGRAPHIC TECHNIQUES.

(Eng.) Evans, G. A.; Jenkins, D. H. R. (Robert Jones and Agnes Hunt Orthopaedic

Hosp., Oswestry, Wales, U.K.). *Br. J. Surg.* 63(6): 438-439; 1976.

The accuracy and postoperative morbidity of cystic duct cannulation by operative cholangiography in 51 patients were compared with the results of cholangiography performed by direct needle puncture of the bile duct in another group of 51 patients, all of whom underwent cholecystectomy. An additional 44 patients who underwent both cholecystectomy and choledochotomy, 19 following cystic duct cannulation and 25 following direct puncture, were also evaluated. There were no significant differences in the incidence of initial postoperative complications following the two methods of cholangiography, and the distribution of various types of complications was similar. The average postoperative hospitalization was 10.3 days in the needle puncture group, compared with 11.6 days in the cannulation group. Comparison of cholecystectomy alone and cholecystectomy with choledochotomy showed no significant difference in the incidence or distribution of complications. Six cholangiograms performed by cannulation had technical shortcomings, one case being abandoned owing to inability to cannulate the cystic duct. Other problems included poor quality radiographs (2), the presence of air bubbles (2), and the passage of the cannula into the duodenum (1). Two cases performed by common duct puncture had technical shortcomings due to poor quality radiographs. The authors suggest that when difficulties arise during cannulation of the cystic duct, direct needle puncture of the common bile duct will produce good quality radiographs and yield the same amount of diagnostic information, with no increase in operative morbidity.

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4484 OPERATIVE CHOLANGIOGRAPHY IN UNCOMPLICATED BILIARY TRACT SURGERY: REVIEW OF 354 CHOLANGIOGRAPHY STUDIES IN PATIENTS WITHOUT INDICATION OF COMMON DUCT PATHOLOGY. (Eng.) Wayne, R.; Cegielski, M.; Bleicher, J.; Saporta, J. (USPHS Hosp., Seattle, WA 98114). *Am. J. Surg.* 131(3):324-327; 1976.

The role of operative cholangiography in revealing unsuspected common duct pathology was assessed in 264 women and 90 men who had nonfunctioning gallbladders or cholelithiasis. A 20-gauge needle bent at an angle of 120 degrees and attached to a 10-cm^3 syringe was used to inject 30% Hypaque (10 ml, over a 1-min period) into the cystic duct, which had been tied at its junction with the gallbladder. Of the 354 cases, operative cholangiography showed normal results in 317. Twenty other patients had technically inadequate studies. All of the 17 patients with abnormal cholangiograms underwent common duct exploration. Three of these patients had a negative exploration (false-positive cholangiogram), 1 had cholangiocarcinoma, and 13 had stones. There was a total of 3.9% of patients with duct disease, unsuspected before cholangiography. The authors suggest that routine operative cholangiography combined with liver function tests may yield an even lower incidence of missed stones.

4485 SUGGESTED NEW RULES FOR EXPLORATION OF THE COMMON BILE DUCT AT CHOLECYSTECTOMY. (Eng.) Hugh, T. B. (St. Vincent's Medical Centre, 376 Victoria St., Darlinghurst, N.S.W. 2010, Australia). *Aust. N.Z. J. Surg.* 45(4):380-383; 1975.

A new set of guidelines for the exploration of the common duct, based on high-quality operative cholangiography (contact cholangiography), is outlined, and the place of supraduodenal and transduodenal routes for exploration is discussed. Results with 120 patients who underwent cholecystectomy are presented. If a stone is palpable in the common bile duct after mobilization of the duodenum, preexploratory cholangiography is omitted. If the stone is mobile, an attempt is made to manipulate it back into the cystic duct, so it can be removed with the gallbladder. If this maneuver is successful (as it was in two cases in this series), an operative cholangiogram is performed; if the cholangiogram is clear, the duct is not explored. If manipulation into the cystic duct is not successful, the stone is removed through a supraduodenal choledochostomy. If the stone is impacted in the terminal part of the duct, supraduodenal exploration is omitted, and transduodenal sphincteroplasty is performed. Sphincteroplasty is also done as the primary procedure when multiple, small stones can be felt or are seen on the x-ray film. In 102 cases, satisfactory cholangiograms were obtained, and no duct exploration was necessary. Stones were found in 14 of 18 cases that underwent exploration. Of 90 patients followed up for 1-4 yr, there has been no proven incidence of residual stone. The results suggest that if the cholangiogram is clear, it is safe not to explore the duct, and that this policy results in a satisfactorily low exploration rate (15%).

4486 FULMINANT CHOLANGITIS AND SEPTICEMIA AFTER ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY (ERC) IN TWO PATIENTS WITH OBSTRUCTIVE JAUNDICE. (Eng.) Thurnherr, N.; Bruhlmann, W. F.; Krejs, G. I.; Bianchi, L.; Faust, H.; Blum, A. L. (Kantonsspital Basel, CH-4004 Basel, Switzerland). *Am. J. Dig. Dis.* 21(6):477-481; 1976.

Two cases of obstructive jaundice with fatal septicemia occurring after endoscopic retrograde cholangiography (ERC) are reported. ERC was performed without difficulty, and both patients appeared to tolerate the procedure very well. ERC showed a clear-cut cause of obstruction in both patients. Multiple gallstones within the gallbladder, hepatic duct, cystic duct, and common duct were found in the first patient, a 54-yr-old woman; a dilated intrahepatic bile duct with a stenosis in the middle common duct due to a carcinoma was found in the other patient, a 51-yr-old man. A surgical procedure was planned for both patients, but delayed to a later and apparently more suitable date. Cholangitis and septicemia developed 72 and 24 hr after the procedure in the first and second patients, resp. The first patient died in septic shock 5 days later.

Blood cultures revealed *Pseudomonas aeruginosa*. The postmortem findings revealed multiple liver abscesses and purulent cholangitis. The second patient died of cardiac arrest following hemodialysis and regional heparinization for anuria 6 days later. The postmortem findings included a carcinoma of the common bile duct involving the cystic duct. There was a severe cholangitis with multiple liver abscesses, kidney abscesses, and an intraventricular cerebral hemorrhage. Blood cultures revealed *Enterobacter cloacae*. The authors suggest that, as in percutaneous transhepatic cholangiography, ERC should only be performed when surgery is planned within 24 hr; in addition, the patient should be treated with antibiotics as soon as the diagnosis of biliary obstruction is made.

4487 ACUTE TORSION OF THE GALLBLADDER: REVIEW OF THE LITERATURE AND REPORT OF A CASE.

(Eng.) Wetstein, L.; Attkiss, M.; Aufses, A. H., Jr. (108-23 Flatlands 9th St., Brooklyn, NY 11236). *Am. Surg.* 42(2):138-141; 1976.

The case of an 85-yr-old man with acute torsion of the gallbladder is presented. The patient presented with right epigastric pain, nausea, and recurrent vomiting. There was no cutaneous or scleral icterus, and the abdomen was scaffoid with no palpable organomegaly. At surgery, 100 cm^3 of seropurulent fluid was found in the peritoneal cavity, and the gallbladder was distended (measuring 15 x 6 cm in largest dimensions), smooth-walled, and purple-black. It had descended into the right lower quadrant and was hanging entirely free from the undersurface of the liver, to which it was attached by an elongated mesentery. The gallbladder was twisted 270 degrees around an axis represented by the cystic duct and cystic artery. It was totally infarcted without perforation, and multiple stones were found in the lumen. The patient recovered after detorsion of the gallbladder, cholecystectomy, and lavage of the peritoneal cavity. For the same reasons that the gallbladder is prone to torsion, it is also amenable to rapid and safe extirpation.

4488 ANOMALOUS LOCATION OF THE PAPILLA OF VATER.

(Eng.) Levine, M. P. (United States Air Force Hosp., Patrick Air Force Base, FL). *Am. Surg.* 42(2):135-137; 1976.

The case of a 69-yr-old woman in whom the common bile duct was found to enter the third (horizontal) portion of the duodenum is presented. The patient had a 10-yr history of episodic colicky upper right quadrant abdominal pain occasioned by fatty foods; she denied the occurrence of jaundice, flatulence, diarrhea, nausea, vomiting, weight loss, or melena. The patient underwent cholecystectomy, and an operative cholangiogram revealed the anomalous location of the papilla of Vater. This is the 38th reported case of this anomaly in the world literature. The anomaly may be responsible for failures during endoscopic retrograde pancreaticocholangiography.

4489 SURGERY OF BILIARY ATRESIA: CURRENT STATUS.

(Eng.) Lilly, J. R.; Altman, P.; Schroter, G.; Shikes, R. H.; Taubman, J. O. (Univ. Colorado Medical Center, 4200 E. Ninth Ave., Denver, CO 80220). *Am. J. Dis. Child.* 129(12):1429-1432; 1975.

Experience with 34 infants with biliary atresia who were treated with hepatic portoenterostomy is reviewed. The success of the operation is contingent upon a proper recognition (confirmed by frozen section examination) and high transection of the extrahepatic biliary structure at the liver hilus and on a perfect placement of the enteric-biliary anastomotic sutures. Sustained bile drainage was obtained in 22 patients; the success rate undoubtedly would have been greater if all infants had been younger than 4 months at the time of diagnosis. However, 9 of 12 patients followed for up to 24 months showed progressive hepatic fibrosis in comparison to the appearance at the time of the portoenterostomy. In addition, all nine patients had a grossly abnormal intrahepatic biliary tree. Better control of cholangitis, a major postoperative complication in many of these infants, may improve these results. An intestinal Roux-en-Y anastomosis, in which a cutaneous double-barreled enterostomy is constructed, was used on the last 14 consecutive patients. The exteriorization of the intestinal segment draining the liver in these patients alleviated the frequency, duration, and severity of (but did not eliminate) ascending cholangitis. The evidence suggests that biliary atresia is an ongoing, obliterative disease involving the intra- and extrahepatic biliary trees. The portoenterostomy must be performed before the obliterative process of the extrahepatic tree is complete.

4490 PRIMARY CARCINOMA OF THE GALLBLADDER: STUDY OF 108 CASES.

(Eng.) Richard, P. F.; Cantin, J. (Hotel-Dieu Hosp., 3840 St. Urbain, Montreal, Quebec H2W IT8, Canada). *Can. J. Surg.* 19(1):27-32; 1976.

Experience with 108 cases of primary carcinoma of the gallbladder that occurred out of 17,698 cases of cancer, exclusive of skin cancer (incidence 0.6%), in one tumor registry is reported. Primary gallbladder carcinoma occurred mainly in women older than 60 yr. Abdominal pain occurred in most patients, and jaundice occurred in more than half. Weight loss was also common. Laboratory and radiographic features were nonspecific. The diagnosis was made or strongly suspected in only one-fourth of the patients. In many patients, the disease was not discovered until pathologic examination was conducted postoperatively. Resection was possible in 41 of the 93 patients who underwent operation, but treatment was conservative because it was palliative in 20. In 20 of the other 21 patients who underwent cholecystectomy, the disease was not recognized at operation. Overall, the 5-yr survival rate was 6.4%; for those who underwent curative resection, it was 33%, and for patients without visible metastases at operation, the mean survival

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was 3 yr. Cholecystectomy, wedge resection of liver, and resection of regional lymph nodes is the most effective treatment for this disease.

4491 EXCRETION OF METHYLPROSCILLARIDIN IN PATIENTS WITH A BILIARY FISTULA.

(Eng.) Staud, R.; Rietbrock, N.; Fassbender, H. P. (Klinikum Steglitz der FU Berlin, Hindenburgdamm 30, 1 Berlin 45, W. Germany). *Eur. J. Clin. Pharmacol.* 9(2/3):99-103; 1975.

Four patients with a biliary fistula received ^{3}H-methylproscillaridin (0.5 mg, p.o.) to determine whether the high fecal excretion of unchanged drug is due to inadequate intestinal absorption or to high biliary excretion. Fifty-five percent of the dose was excreted in bile, 16% in urine, and 3% in feces. Over 60% of the radioactivity excreted in bile and urine appeared within the first 24 hr. Seventy-eight percent of the radioactivity in bile consisted of $CHCl_3$-insoluble metabolites of methylproscillaridin; incubation of it with 5 mg of β-glucuronidase led to splitting off glucuronic acid from almost 80%. Methylproscillaridin can be regarded as the principal conjugated compound. Trichloroacetic acid-separation of $CHCl_3$-soluble compounds from bile showed identical running of radioactivity with methylproscillaridin, proscillaridin, and scillarenin and three unknown metabolites P_1, P_2, and P_3. In urine, the $CHCl_3$-soluble fraction averaged 16-34% of the total amount and was identified as methylproscillaridin, proscillaridin, scillarenin, P_2 and P_3. The relative composition of the total radioactivity in feces amounted to 77% methylproscillaridin, 4% scillarenin, and 12% polar metabolites. It is concluded that p.o.-administered methylproscillaridin is rapidly metabolized to $CHCl_3$-insoluble conjugates, which are mainly excreted in the bile. Accordingly, methylproscillaridin may be appropriate for the treatment of patients with impaired renal function.

4492 CHOLELITHIASIS IN A NEONATE.

(Eng.) Hughes, R. G.; Mayell, M. J. (Frenchay Hosp., Bristol BS16 1LE, U.K.). *Arch. Dis. Child.* 50(10):815-816; 1975.

The case of a neonate with cholelithiasis is reported. Laparotomy was performed on the 6-day-old boy because of unexplained vomiting. The only abnormality found was an inflamed gallbladder leaking yellow bile and containing three small stones. Cholecystostomy was performed, and the child was taking full feeds by the 12th postoperative day. Qualitative biochemical analysis of the stones showed them to be composed of cholesterol, calcium, and bilirubin. The child was not then and has not now been jaundiced. This is believed to be the youngest otherwise normal child with this disease.

4493 ARE ANTIBIOTICS NECESSARY IN ACUTE CHOLECYSTITIS?

(Eng.) Kune, G. A.; Burdon, J. G. W. (61 Erin St., Richmond, Victoria, Australia 3121). *Med. J. Aust.* 2(16):627-630; 1975.

The value of antibiotics in the treatment of acute cholecystitis was investigated in 302 cases. A total of 189 patients underwent surgery during an attack of acute cholecystitis. Broad spectrum antibiotics (such as tetracycline or ampicillin) were administered to 85 patients before surgery; no antibiotics were given to 104 patients. Local septic complications, such as empyema formation, perforation of the gallbladder with pericholecystic abscess, and gangrene of the gallbladder with local sepsis, occurred in 28 cases. Of the patients experiencing complications following surgery, 50% had received antibiotics. Broad spectrum antibiotics administered during and immediately after surgery were of value in lowering the risk of developing wound infection in patients with local septic complications of acute cholecystitis. Only three patients developed septicemia, none of whom were receiving antibiotics when the septicemia was discovered. No patient receiving broad spectrum drugs developed septicemia. Patients at risk were over 60 yr of age or had a debilitating disease, which lowers host resistance to infection, or already had a septic complication, such as pericholecystic abscess. Patients under 60 yr of age who have uncomplicated acute cholecystitis do not require antibiotics. It is concluded that antibiotics are valueless in decreasing the incidence of local septic complications, but are valuable in decreasing the number of wound infections and the incidence of septicemia in patients at risk.

4494 ANICTERIC CHOLECYSTITIS: WITH VERY HIGH SERUM GLUTAMIC OXALOACETIC TRANSAMINASE.

(Eng.) Adams, J. T.; Carter, S. L. (Univ. Rochester Medical Center, Rochester, NY). *N.Y. State J. Med.* 76(2):268-271; 1976.

The case report of a 26-yr-old woman with anicteric cholecystitis and an SGOT of 2,350 IU is presented together with a summary of three similarly anicteric patients with SGOT values of over 1,000 IU. Initially, a diagnosis of acute cholecystitis and coincidental serum hepatitis was made in the first patient, the latter part of the diagnosis being based on the very high SGOT value. She was treated with gastric suction, parenteral ampicillin, i.v. fluids, and meperidine hydrochloride. The patient improved rapidly; the SGOT value decreased rapidly, making a diagnosis of hepatitis unlikely. Laparotomy revealed gallstones and a common bile duct of normal size; a cholecystectomy was performed and the postoperative course was uneventful. The ages of the other three patients ranged between 19-54 yr. Two had had a normal gallbladder series within 6 months of the onset of their acute symptoms. All patients were treated with broad spectrum antibiotics, nasogastric suction, and i.v. fluids, and all showed improvement of symptoms within 72 hr after the onset of treatment; SGOT levels fell rapidly to achieve a normal value within 5 days from the time of onset of symptoms. Common duct exploration or operative cholangiogram was carried out in each patient, and in no instance was there recovery of, or demonstration of, common bile duct stones. It is concluded that although a very high SGOT is unusual in anicteric patients with acute cholecystitis, an awareness of ts possible occurrence is important to obviate rrors in diagnosis and treatment.

495 JAUNDICE IN PATIENTS WITH ACUTE CHOLECYSTITIS. ITS VALIDITY AS AN INDICATION OR COMMON BILE DUCT EXPLORATION. (Eng.) Cheung, . Y.; Maxwell, J. G. (Univ. Utah Coll. Medicine, 0 N. Medical Drive, Salt Lake City, UT 84132). *m. J. Surg.* 130(6):746-748; 1975.

o evaluate the validity of using jaundice as a riterion for choledochotomy, the incidence of aundice, the incidence of choledocholithiasis, he association of jaundice and ductal stones, and auses of jaundice other than choledocholithiasis ere investigated in 41 patients with proven holecystitis. Of the 33 patients in whom serum ilirubin was determined, 24 had elevated total ilirubin; this elevation was mild (1.2-3 mg/100 ml) n 16, moderate (3-6 mg/100 ml) in 6, and severe (>7 mg/100 ml) in 2. Of all 41 patients, only one ad ductal stones, and his preoperative serum biliubin level was 5.6 mg/100 ml. The remaining atients had no evidence of ductal stones, as deterined either by ductal exploration or by preoperaive and/or operative cholangiography. Jaundice oes not appear to be a compelling reason for choleochotomy, and less invasive techniques, such as i.v. and intraoperative cholangiography should sufice to exclude the possibility of common bile duct tone in patients with acute cholecystitis.

4496 EFFECT OF CHENODEOXYCHOLIC ACID AND PHENOBARBITAL ON THE RATE-LIMITING ENZYMES OF HEPATIC CHOLESTEROL AND BILE ACID SYNTHESIS IN PATIENTS WITH GALLSTONES. (Eng.) Coyne, M. J.; Bonorris, G. G.; Goldstein, L. I.; Schoenfield, L. J. (Cedars-Sinai Medical Center, Los Angeles, CA). *J. Lab. Clin. Med.* 87(2):281-291; 1976.

The effects of chenodeoxycholic acid (CDC, 750 mg/day), phenobarbital (PB, 90 or 180 mg), combined therapy (CDC + PB), and a placebo on biliary lipid composition and on the rate-limiting enzymes of hepatic cholesterol synthesis (HMG-CoA reductase) and bile acid synthesis (cholesterol-7α-hydroxylase) were studied. Percutaneous liver biopsies were performed after 6 months of therapy in four patients from each group participating in a double-blind study of gallstone dissolution. The enzyme activities were also assayed in liver obtained at laparotomy in seven untreated gallstone patients and in four without gallstones. 7α,12α-Dihydroxycholest-4-en-3-one-12α-hydroxylase was determined in four untreated gallstone patients and in four without gallstones. Untreated gallstone patients had 35% greater HMG-CoA reductase ($p<0.01$), 37% less 7α-hydroxylase ($p<0.01$), and 40% less 12α-hydroxylase ($p<0.01$) than patients without gallstones. CDC, PB, and both increased biliary CDC and decreased the lithogenic index significantly ($p<0.01$), but saturated bile persisted with PB. CDC decreased HMG-CoA reductase 40% ($p<0.01$) and 7α-hydroxylase 47% ($p<0.01$). PB increased HMG-CoA reductase 112% ($p<0.01$) and 7α-hydroxylase 20% ($p<0.01$). The combination of CDC and PB increased HMG-CoA reductase 40% ($p<0.01$) and had no effect on 7α-hydroxylase. In conclusion, CDC induced desaturation of bile while decreasing HMG-CoA reductase and increasing CDC in bile. PB reduced the saturation less effectively than CDC; it increased 7α-hydroxylase but also increased HMG-CoA reductase.

4497 GALLSTONE DISSOLUTION IN MAN USING CHOLIC ACID AND LECITHIN. (Eng.) Toouli, J.; Jablonski, P.; Watts, J. M. (Prince Henry's Hosp., Melbourne, Australia). *Lancet* 2(7945):1124-1126; 1975.

The effect of treatment with p.o. cholic acid (750 mg) and purified soybean lecithin (2,250 mg) daily for 6 months was studied in seven patients with radiolucent stones in the gallbladder and in two patients with radiolucent stones in the biliary tree. In two patients, the stones disappeared, and in one patient, the stones were reduced in size. Fasting bile samples were obtained, before and during treatment, in five patients and were assayed for cholesterol, bile acid, and phospholipid. In all five patients, the lithogenic index of bile was reduced during treatment. In each patient, the proportions of chenodeoxycholic acid and deoxycholic acid were reversed; the mean proportions were reversed from 40% and 10% of total bile acid initially to 12% and 48%, resp., after treatment. The proportions of cholic acid and lithocholic acid were unaffected. While it is known that p.o. administration of cholic acid alone does not dissolve gallstones, these studies suggest that a combination of cholic acid and soybean lecithin does lower the cholesterol saturation of bile and may promote gallstone dissolution. More extensive studies are necessary.

4498 THE TREATMENT OF PATIENTS WITH GALLSTONES BY LECITHIN. (Eng.) Tuzhilin, S. A.; Dreiling, D. A.; Narodetskaja, R. V.; Lukash, L. K. (First Moscow Medical Inst., Moscow, USSR). *Am. J. Gastroenterol.* 65(3):231-235; 1976.

The effect of peroral lecithin on gallstones and bile composition was investigated in eight patients. Lecithin (0.1 g, p.o., 3 times daily) was administered for 18 months to 2 yr. There was a decrease in the severity of the following clinical symptoms: frequency of acute abdominal attacks, dull abdominal pain, abdominal tenderness, and other abdominal signs (Ortner, Murphy, left diaphragm). There was a change in the composition of both B bile (gallbladder bile) and C bile (hepatic duct bile) before and after lecithin. The average mg% difference in B bile of the lecithin treated patients compared to 20 controls was $p>0.10$ for cholic acid, $p<0.001$ for phospholipids, $p<0.02$ for cholesterol, and $p<0.01$ for the cholate/cholesterol ratio. The average mg% difference in the C bile of the lecithin patients compared to 20 control subjects was $p>0.10$ for cholic acid, $p<0.01$ for phospholipids, $p>0.10$ for cholesterol, and $p<0.002$ for cholate/cholesterol ratio. In seven of eight patients,

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there was no change in the number or the size of the gallstones. In those instances in which cholecystography visualized a gallbladder, the radiologist reported a sharper outline of the viscus, and some decreases in size and clearer focus of stones. Although the results with lecithin treatment are not as dramatic as had been reported for chenodeoxycholic acid, these preliminary studies indicate alterations in bile composition, which are desirable in the dissolution of gallstones.

4499 COMPLICATIONS OF NONOPERATIVE EXTRACTION OF RETAINED COMMON DUCT STONES. (Eng.) Burhenne, H. J. (Children's Hosp. and Adult Medical Center, 3700 California St., San Francisco, CA 94118). *Am. J. Surg.* 131(3):260-262; 1976.

Complications in 612 patients who had undergone nonoperative extraction of retained common duct stones are reviewed. There was no mortality, but 33 patients showed some complications. Reoperation for failure of stone extraction was required in 9% of the patients. One of two patients who developed subhepatic bile collection required reoperation for drainage. One of three patients in whom papillomas of the common duct were mistaken for stones required another operation to remove the stone extraction basket caught on the papilloma. A third patient required a reoperation because a large stone was trapped in the stone extraction basket and could not be extracted through the sinus tract. All other complications subsided completely within 48 hr or less. Other complications included sinus tract perforations with extravasation of contrast (7 patients), fever (12 patients), *Escherichia coli* sepsis (2 patients), pancreatitis (2 patients), and vasovagal reaction (2 patients). Bile duct perforations or subdiaphragmatic abscesses were not reported in any of the cases. It is concluded that morbidity and mortality with this new procedure of percutaneous stone removal is significantly less than that with operative reexploration of the common duct. The authors recommend that a T-tube of no less than #14 French caliber should be used routinely during this procedure and that Penrose drains should be placed separately from the T-tube, and the T-tube should be brought out through a lateral stab wound.

4500 ACALCULOUS CLONORCHIASIS OBSTRUCTING THE COMMON BILE DUCT: A CASE REPORT AND REVIEW OF THE LITERATURE. (Eng.) Ameres, J. P.; Levine, M. P.; DeBlasi, H. P. (New York Medical Coll., New York, NY). *Am. Surg.* 42(3):170-172; 1976.

The case of a 37-yr-old man with acalculous clonorchiasis biliary tract obstruction is reported. The patient presented with epigastric and right upper quadrant pain, vomiting, and icterus. Cholecystectomy was performed because the gallbladder was distended. When the common bile duct was incised, fluid containing 10- to 20-mm leaf-like structures emerged. The parasites, later determined to be *Clonorchis sinensis*, were removed from the right, left, and common hepatic ducts. Cholangiography demonstrated dilated right and left hepatic ducts and irregular, blunted terminal biliary passages. Postoperatively, the patient drained several more parasites, but became anicteric and afebrile. This is the fourth reported case of acalculous clonorchiasis in which the major bile ducts were obstructed.

4501 PLASMA LIPIDS IN EXTRA HEPATIC BILIARY OBSTRUCTION. (Eng.) Mistilis, S. P.; Goren, R.; Tall, A. R.; Hickie, J. R. (Sydney Hosp., Sydney, N.S.W. 2000, Australia). *Aust. N.Z. J. Med.* 5(6):540-543; 1975.

Plasma lipids and lipoproteins were analyzed in 15 patients with proven extrahepatic biliary obstruction (EHO), in eight patients with Fredrickson Type IV hypertriglyceridemia, and in 23 controls to determine whether the lipid disturbances in EHO are confined to the phospholipids and cholesterol fractions and whether the hypertriglyceridemia found in isolated cases of EHO is a consistent symptom. Plasma lipids were compared before and after surgical relief of the obstruction in EHO. In the patients with EHO (aged 16-78 yr), compared with the controls (aged 18-63 yr), there was an increase in total cholesterol (EHO mean, 356.5 mg/dl; controls, 167 mg/dl) due to an increase in the unesterified fraction (EHO mean, 131.5 mg/dl; control, 119 mg/dl), to an increase in the unesterified to esterified cholesterol ratio (EHO mean, 2.3; controls, 0.38), to an increase in phospholipids (EHO mean, 465 mg/dl; controls, 186 mg/dl), and to an increase in the phospholipid to cholesterol ratio (EHO mean, 1.37; controls, 1.02). The most striking finding was a marked and persistent elevation of triglyceride (EHO mean, 289 mg/dl; control, 92 mg/dl). The increase in triglyceride was of a similar magnitude to cholesterol and phospholipid. Following relief of obstruction, the triglyceride returned to normal. The hypertriglyceridemia in cases of EHO was associated with a clear serum and negative cold aggregation test, in contrast to the changes in cases of endogenous type IV hypertriglyceridemia. Hypertriglyceridemia in EHO was associated with a broad beta fraction on the electrophoretogram. Lipoprotein-X was also detected and persisted after the relief of the obstruction, despite the return of other lipid changes to normal. Since lipoprotein-X is known to contain only 2-3% triglyceride, its presence does not account for elevated triglyceride levels. This suggests that triglyceride is being transported in either very low density lipoprotein particles or in a low density lipoprotein fraction other than lipoprotein-X, which is markedly increased in cholestasis

4502 THE EFFECTS OF HEPATIC PUNCTURES: AN ANALYSIS OF COMPLICATIONS FROM PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY IN 291 CASES, WITH SPECIAL EMPHASIS ON THE DEVELOPMENT OF INTRAHEPATIC TRAUMATIC FISTULAS. (Por.) Reibscheid, S.; Lederman, H.; Secaf, F.; Faria, P. A. J.; Ganc, A. J. (Servico de Radiodiagnostico do Hospital Israelita Albert Einstein). *Rev. Paul. Med.* 84(3/4):97-106; 1974.

Complications caused by percutaneous transhepatic cholangiographies (PTCh) are reported in 291 patients, of whom 51 had pancreatic tumors; 44 had tumors of the liver and bile ducts, 10 had metastatic hepatoma; 46 had choledocholithiasis; 23 had cicatricial stenosis from bilidigestive anastomosis; 31 had chronic pancreatitis; 18 had cholelithiasis, 64 had hepatitis, cirrhosis, postcholecystectomy syndrome, or schistosomiasis; and 4 had miscellaneous diseases. Complications occurred only when the PTCh could be completed (239/291 patients) and were easily corrected by subsequent surgery or medical treatment. Choleperitoneum was the most frequent complication and was observed in 11 patients, hematobilia occurred in 7 patients, fever in 4, puncture of the gallbladder in 3, hepatic laceration in 1, and air in the biliary passages in 1. One patient with choleperitoneum associated with hemoperitoneum died from generalized intravascular coagulation after corrective surgery (bilidigestive anastomosis). All cases of hemoperitoneum and hematobilia were asymptomatic, as were 3 of 11 cases of choleperitoneum. Previous or concurrent biliary infection in four patients was controlled by treatment with i.v. antibiotics. It is suggested that all complications, excepting one case of choleperitoneum with evident hepatic laceration, were induced by traumatic fistulae, which occurred without visible lesions and were caused by the trajectory of the puncture needle interfering with the elastic forces of the liver or with the coagulation mechanisms. PTCh is a useful method in differential diagnosis and postoperative or anatomopathological evaluation. The use of an image intensifier with television monitoring is compulsory; surgery, when indicated, must be performed soon after the PTCh, independent of the signs and symptoms of complications.

4503 EFFECT OF HEALTH RESORT TREATMENT ON THE DYNAMICS OF BIOCHEMICAL INDICES OF THE BILE IN PATIENTS WITH CHRONIC CALCULOUS CHOLECYSTITIS. (Rus.) Rospopa, V. A. (Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Vrach. Delo* (1):53-55; 1976.

4504 FUNCTIONAL STATUS OF THE BILIARY SYSTEM IN YOUNG SCHOOL CHILDREN WITH AND WITHOUT CHRONIC CHOLECYSTOCHOLANGITIS. (Rus.) Sitnichenko, E. P. (Perm Medical Inst., Perm, USSR). *Lab. Delo* (9):546-548; 1975.

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4506 A CASE OF CHOLELITHIASIS COMPLICATED WITH SPONTANEOUS EXTERNAL FISTULA. (Pol.) Czyrnek, T.; Kubicki, B.; Wolnicki, L. (Oddz. Szpitala Miejskiego Nr 2, Pl. Smolki 7/3, 43-300 Bielsko Biala, Poland). *Wiad. Lek.* 29(5):425-427; 1976.

4507 BILE LIPID CHANGE INVESTIGATION IN CHOLELITHIASIS. (Cze.) Hrabak, P.; Skorepa, J.; Doskova, M.; Novotny, L.; Konecny, K.; Zak, A.; Zeman, M. (Fakulta vseobecneho lekarstvi University Karlovy, 128 08 Prague 2, U nemocnice 2, Czechoslovakia). *Cas. Lek. Cesk.* 114(34/35):1054-1060; 1975.

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4512 RESIDUAL GALLBLADDER. (Ger.) Usbeck, W.; Friedrich, U. (Chirurgische Klinik und Poliklinik der Medizinischen Akademie, 50 Erfurt, Nordhauser Str. 74, E. Germany). *Dtsch. Gesundheitsw.* 31(4):172-175; 1976.

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4514 NON-LITHIASIC ACUTE CHOLECYSTITIS AND NECROTIC ENTERITIS. (Fre.) Devic, G.; Gelain, J. (46 Bld. of the Republic, 38200 Vienna, Austria). *Lyon Chir.* 71(5):354-356; 1975.

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4526 MIGRATING LITHIASIS OF THE COMMON BILE DUCT REMOVAL IN THE COURSE OF HIGH PRESSURE CHOLANGIOGRAPHY WITH AMYL NITRITE. (Fre.) Roux, M. (Hopital de Vaugirard, 389, rue de Vaugirard, 75015 Paris, France). *Sem. Hop. Paris* 50(41):2554-2555; 1974.

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4528 PERFORATING GANGRENOUS CHOLECYSTITIS IN A SEVERELY BURNED PATIENT. (Rus.) Taran, V. M. (Khmelnitski Regional Hosp., Khmelnitski, USSR). *Klin. Khir.* (1):69-70; 1976.

4529 USE OF POLYGLUCIN TO NORMALIZE CERTAIN HEMODYNAMIC PARAMETERS IN GASTRIC RESECTION AND CHOLECYSTECTOMY. (Rus.) Zhuravlev, V. A.; Korepanov, V. I. (Kirov Scientific Res. Inst. Blood Transfusion, Kirov, USSR). *Klin. Khir.* (10):73-74; 1975.

4530 MALIGNANT TUMORS OF THE GALLBLADDER. (Rus Shnaider, L. Ia.; Korshunov, A. V.; Andreson, K. V. (Omsk Oblast Clinical Hosp., Omsk, USSR). *Klin. Khir.* (10):72-73; 1975.

4531 SURGICAL TACTICS IN ACUTE CHOLECYSTITIS IN OLD AND VERY OLD PATIENTS. (Rus.) Liul'ka, A. N.; Mazurik, M. F.; Dudenko, F. I. (Poltava Medical Inst. Stomatology, Poltava, USSR). *Klin. Khir.* (10):28-30; 1975.

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4533 ENERGY TURNOVER IN CHRONIC CHOLANGITIS IN CHILDREN. (Rus.) Franovs'ka, O. G. (Vinnitsa Medical Inst., Vinnitsa, USSR). *Pediatr. Akush. Ginekol.* 37(4):19-20; 1975.

See also, 4003, 4004, 4005, 4013, 4014, 4031, 4036, 4038, 4039, 4041, 4042, 4043, 4044, 4045, 4060, 4066, 4225, 4235, 4300, 4312, 4319, 4340, 4341, 4473.

4534 HIGH INTESTINAL LACTASE CONCENTRATIONS IN ADULT ARABS IN SAUDI ARABIA.

(Eng.) Cook, G. C.; Al-Torki, M. T. (Univ. Riyadh, Riyadh, Saudi Arabia). *Br. Med. J.* 3(5976):135-136; 1975.

The maximum rise in blood glucose after the administration of lactose (50 g, p.o.) was found in 40 adult Arab patients without evidence of gastrointestinal disease, malnutrition, or diabetes mellitus. There were 14 Bedouin, 8 urban Saudi, 8 Yemeni, 1 Syrian, and 9 patients of mixed ancestory (usually partly African). Twenty-five of the Bedouin, Saudi, and Yemeni patients had an increase of over 1.1 mM (20 mg/100 ml) blood glucose, while two patients of mixed ancestory had the same increase. The Syrian patient had an increase of 0.6 mM. Most adult northern Europeans, Hamitic people of northern Africa, and Arabs in Saudi Arabia usually have high intestinal lactase concentrations. The persistence of high lactase levels probably originated in the Arabian peninsula. Its selective advantage may have been associated with the fluid and calorie content of camel's milk, which is important for survival in desert nomads.

4535 ESSENTIAL FATTY ACID DEFICIENCY IN HUMAN ADULTS DURING TOTAL PARENTERAL NUTRITION.

(Eng.) Riella, M. C.; Broviac, J. W.; Wells, M.; Scribner, B. H. (Dept. Medicine, Univ. Washington, Seattle, WA 98195). *Ann. Intern. Med.* 83(6):786-789; 1975.

The case reports of three patients who developed dry scaly skin lesions due to essential fatty acid deficiency while undergoing prolonged total parenteral nutrition are presented. The first patient, a 60-yr-old woman with advanced malnutrition secondary to short bowel syndrome, developed the lesions 46 days after the initiation of parenteral nutrition. The lesions were initially discrete and localized to body folds, but later became generalized. The second patient, a 53-yr-old woman with malabsorption secondary to intractable sprue, developed erythematous lesions after 6 months of parenteral nutrition. The third patient, a 13-yr-old girl with systemic mast cell disease and chronic malabsorption, developed lesions after 2 yr of parenteral nutrition. There was a marked elevation of 5,8,11-eicosatrienoic acid ($20{:}3\omega 9$; 7.4, 5.3, and 6.6% in the first, second, and third patients, resp.), and a high $20{:}3\omega 9$-to-$20{:}4\omega 6$ ratio (representing the severity of essential fatty acid deficiency) in all patients. When parenteral fat (Intralipid, 500 ml/day) was administered there was a progressive normalization of the abnormal lipid pattern and complete clearing of the skin within 14 days and 4 weeks in patients 1 and 2, resp.; in the third patient, only signs of urticaria pigmentosa were present after 6 weeks. Because more and more patients are becoming partly or totally dependent on parenteral nutrition for prolonged periods of time, the availability of parenteral fat preparations is urgently needed.

4536 PROTEIN ABSORPTION AND AMMONIA PRODUCTION: THE EFFECTS OF DIETARY PROTEIN AND REMOVAL OF THE COLON.

(Eng.) Gibson, J. A.; Sladen, G. E.; Dawson, A. M. (St. Bartholomew's Hosp., London ECIA 7BE, England). *Br. J. Nutr.* 35(1):61-65; 1976.

The effect of an increased dietary protein content on the amount of fecal nitrogen was measured in five subjects without functioning colons (3 with ileostomy and 2 with ileo-rectal anastomosis) and in six normal controls. All subjects were given a low (40 g/day)- and a high (100 g/day)-protein diet. In the controls, a 5-day equilibration period was allowed with each diet; in the test subjects, a 2-day period was allowed. By increasing the amount of dietary protein, an increase in blood urea concentration from 3.63 mM with the low-protein diet to 5.98 mM with the high-protein diet ($p<0.001$) was seen in all subjects. In controls, neither fecal nitrogen excretion nor fecal nitrogen concentration was increased significantly. The increase in the dietary protein content in test subjects resulted in a significant increase in both fecal nitrogen excretion and fecal nitrogen concentration ($p<0.05$ and $p<0.02$ for low- and high-protein diets, resp.). It is concluded that protein absorption by the small intestine is not 100% efficient and that an increase in dietary protein content results in a significant increase in nitrogen leaving the ileum. The findings confirm the rationale of the current practice of controlling NH_3 production in hepatic encephalopathy by dietary protein restriction.

4537 MUCOSAL ADHERENCE OF HUMAN ENTEROPATHOGENIC ESCHERICHIA COLI.

(Eng.) McNeish, A. S.; Fleming, J.; Turner, P.; Evans, N. (Inst. Child Health, Francis Rd., Birmingham B16 8ET, England). *Lancet* 2(7942):946-948; 1975.

The adhesion of enteropathogenic and nonenteropathogenic *Escherichia coli* strains to the mucosa of human fetal small intestine was measured by a newly modified *in vitro* assay. Intestinal fragments, approximately 15 mm^2, were taken from the jejunum of 28 fetuses and incubated with gentle rotation for 30 min or 1 sec in 1 ml of a suspension containing the test organism and 0.5% D-mannose. After washing and homogenization, the number of viable organisms released from each fragment was determined; the increase in the number of adhering organisms between 1 sec and 30 min of incubation was the measure of their mucosal adhesiveness. The mean increases in adhering organisms for the enteropathologic strains, 026 K60 H11 and 078 H12, were 4.15 and 3.82 $\log_{10}$ U, resp. These values were significantly greater ($p<0.01$) than for the non-pathogenic strains, 01 K1 H7 (mean 0.81 $\log_{10}$ U), 015 K14 H4 (mean 0.64 $\log_{10}$ U), and 075 K? H5 (mean 0). For the 026 K60 H11 and the 01 K1 H7 strains, the difference was significant at $p<10^{-7}$. Similar results were obtained whether the mucosa was used immediately or after 6-12 hr of organ culture. The adhesion to the mucosa of the pathogenic strains is not thought to be caused by common fimbriae; suspensions that were positive in the adhesion test did not cause hemagglutination, and there was no mucosal adhesion of the strain

(0.75 K? H5) that caused the strongest hemagglutination. Mucosal adhesion may be as important as enterotoxin production or invasiveness in determining the virulence of some strains of human enteropathogens.

4538 INTESTINAL ABSORPTION OF AMINO ACIDS AND PEPTIDES IN HARTNUP DISORDER. (Eng.)

Leonard, J. V.; Marrs, T. C.; Addison, J. M.; Burston, D.; Clegg, K. M.; Lloyd, J. K.; Matthews, D. M.; Seakins, J. W. (Inst. Child Health, London, England). *Pediatr. Res.* 10(4):246-249; 1976.

Absorption and renal clearances of amino acids were investigated in a 26-month-old girl (whose case report is presented) with Hartnup disorder. Plasma levels of amino acids were followed in the patient and in six normal adult controls before and 15, 30, and 45 min after the p.o. administration of an amino acid mixture simulating casein (5 and 10 g in patient and adults, resp.) and after the administration of an equivalent dose of a partial enzymic hydrolysate of casein containing oligopeptides in addition to free amino acids (4.7 and 9.4 g, resp.). In the adults, the increments in the plasma level of a given amino acid were similar whether the amino acid mixture or enzymic hydrolysate was given. In the patient, there was a large increase in plasma levels of lysine, arginine, and proline after both the amino acid mixture (resting levels 164, 78, and 137 μM for lysine, arginine, and proline, resp.; 149-189, 50-94, and 210-401 μM, resp., at intervals after amino acid mixture) and the enzyme hydrolysate (resting levels 152, 94, and 230 μM, resp.; 135-186, 44-57, and 89-274 μM, resp. after enzymic hydrolysate). There was neither an increase nor a decrease in plasma levels of glycine, histidine, tryptophan, serine, and glutamic acid after administration of the amino acid mixture, but there was an increase after the enzymic hydrolysate. The increments of alanine, valine, leucine, methionine, phenylalanine, and isoleucine after the enzymic hydrolysate were greater than after the amino acid mixture. After the amino acid mixture there was an initial rise of threonine in plasma levels, and after the enzymic hydrolysate, there was an initial fall. Renal clearances of proline, glutamic acid, asparagine, and lysine (0, 2, 2, and 2 ml/min 1.73 m^2, resp.) were normal, and those of arginine and glutamine were slightly increased (1 and 5 ml/min 1.73 m^2, resp.). The clearance of glycine was slightly increased (8 ml/min) and that of histidine, tyrosine, and serine plus asparagine, alanine, valine, leucine, isoleucine, methionine, phenylalanine, and threonine were greatly increased (86, 81, 24, 10, 41, 5, 6, 8, 13, and 14 ml/min, resp.). The authors conclude that the absorption of free glycine, histidine, tyrosine, and serine was probably severely impaired and that of valine, leucine, isoleucine, methionine, phenylalanine, glutamic acid, and alanine was subnormal. The results indicate that many neutral amino acids are malabsorbed in Hartnup disorder. Amino acids that are poorly absorbed in the free form are better absorbed from peptides. Most amino acids with a substantial increase in renal clearance are also poorly absorbed.

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4539 EFFECT OF LIVER FAILURE ON THE VENTILATORY RESPONSE TO HYPOXIA IN MAN AND THE GOAT.

(Eng.) Stanley, N. N.; Kelsen, S. G.; Cherniack, N. S. (Central Middlesex Hosp., Acton Lane, London NW10 7NS, England). *Clin. Sci. Mol. Med.* 50(1):25-35; 1976.

The ventilatory responses to transient and steady state hypoxia were measured in 10 patients with hepatic cirrhosis, in 10 healthy controls, and in 7 goats. The average ventilatory response to transient hypoxia in the patients was 0.91, significantly different from the 0.51 l/min % Sa, O_2^{-1} in the control subjects ($p<0.01$). The average response to steady state isocapnic hypoxia in the patients was 0.41 compared with 0.44 l/min % Sa, O_2^{-1} in the control subjects. The average difference between the responses to steady state hypoxia and transient hypoxia was 0.50 l/min % Sa, O_2^{-1} in the patients, which was significantly greater ($p<0.01$) than the average difference of 0.07 l/min % Sa, O_2^{-1} in the control subjects. All goats developed a respiratory alkalosis when in severe liver failure (experimentally induced). Compared to the initial baseline measurements, the Pa, CO_2 fell from an average of 5.43 to 4.16 kPa, and the average arterial pH increased from 7.404 to 7.446. There was no significant change in the average Pa, O_2. The ventilatory response to transient hypoxia rose from an average of 0.23 to 0.37 l/min % Sa, O_2^{-1} ($p<0.01$) after the development of liver failure, while the response to steady state hypoxia decreased slightly ($p<0.01$) to 0.20/min % Sa, O_2^{-1}. The ratio of the slope of the ventilation/Pa, CO_2 response line in hypoxia to the slope in hypoxia was 1.67 in the baseline studies, but it declined to 1.03 when liver failure was present. The Pa, O_2 values were similar during hypoxic hypercapnia and liver failure. The findings suggest that liver failure heightens the sensitivity of the peripheral chemoreceptors to the hypoxic stimulus, but may increase the tendency of the medullary centers to become depressed in hypoxia.

4540 VOLUME AND pH OF GASTRIC JUICE IN OBESE PATIENTS.

(Eng.) Vaughan, R. W.; Bauer, S.; Wise, L. (Univ. Arizona Coll. Medicine, Tucson, AZ 85724). *Anesthesiology* 43(6):686-689; 1975.

To determine whether obese patients are prone to the development of aspiration of stomach contents into the tracheobronchial tree, the pH, volume, and color of gastric juice were determined preoperatively in 56 obese patients and in 50 nonobese patients. All obese patients underwent jejuno-ileal small bowel bypass operations, while the nonobese patients underwent cholecystectomy, colonic resection, abdominal hysterectomy, or exploratory laparotomy. The combination of a low pH (<2.5) and a large volume of gastric juice (>25 ml) was found in 42 obese patients, while this combination was not found in the nonobese patients. There was no correlation between pH and the color of the initial aspirate. The pH medians for the obese and nonobese patients were 1.3 and 3.7, resp. The medians of the volume of gastric juice for the obese and nonobese patients were 37.7 and 11.0 ml, resp. These data suggest that particular care should be taken in the induction of anesthesia in obese patients.

4541 CELLULAR IMMUNE REACTIONS AGAINST COMMON ANTIGEN, SMALL INTESTINE, AND COLON ANTIGEN IN PATIENTS WITH CROHN'S DISEASE, ULCERATIVE COLITIS, AND CIRRHOSIS OF THE LIVER. (Eng.) Eckhardt, R.; Heinisch, M.; Meyer Zum Buschenfelde, K. H. (Second Univ. Medical Clinic, D-6500 Mainz, Langenbeckstrasse 1, W. Germany). *Scand. J. Gastroenterol.* 11(1):49-54; 1976.

Cellular and humoral immunity against common antigen (CA), microsomal antigens, and soluble antigens from human fetal small intestine and colon were measured in 41 patients with Crohn's disease and in 31 patients with ulcerative colitis. Cellular immunity against CA and intestinal antigens was also measured in 24 patients with liver cirrhosis. Seventy-one to 93% of the patients with ulcerative colitis and 64-91% of those with cirrhosis of the liver showed cellular immunity against CA and human fetal intestinal antigens, as measured by the leukocyte migration inhibition test (LMIT). Of the 24 patients with Crohn's disease who were not under immunosuppression, 38% showed cellular immunity against colon antigen; 50% of these 24 patients and 26% of 23 patients were below the normal range, using small intestine or CA as test antigens. Approximately 30% of patients with Crohn's disease and ulcerative colitis had elevated antibody titers against intestinal antigens and CA. Fifty-nine to 87% of the patients with ulcerative colitis showed a reciprocal relationship between cellular and humoral immunity, and 38-50% of those with Crohn's disease showed the same relation. Crohn's disease and ulcerative colitis can be separated in most cases by using intestinal antigens and CA in the LMIT. The occurrence of cellular immunity against these antigens cannot be interpreted as the only pathogenetic principle in these two diseases. There appears to be only a weak immune tolerance against intestinal antigens. The high percentage of cellular immune reactions in patients with cirrhosis of the liver demonstrates that they may have an impairment of the physiologic elimination of antigens by the liver.

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Parasitology

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See also, 4064, 4072, 4500.

Regional Enteritis

4576 EARLY COMPLICATIONS IN PATIENTS PREVIOUSLY TREATED WITH CORTICOSTEROIDS. A RETROSPECTIVE STUDY OF 250 OPERATIONS ON PATIENTS WITH CROHN'S DISEASE OR ULCERATIVE COLITIS. (Eng.) Knudsen, L.; Christiansen, L.; Jarnum, S. (Rigshospitalet, 2100 Copenhagen O, Denmark). *Scand. J. Gastroenterol.* 11(37):123-128; 1976.

A retrospective analysis of 205 major operations performed over a 10-yr period on 95 previously steroid-treated patients with Crohn's disease (CD) or ulcerative colitis (UC) is presented. All patients had been treated both in the medical and in the surgical gastroenterological departments. The patients were divided into three groups: group 1 patients received daily doses of >40 mg prednisone, which was withdrawn less than a week before surgery; group 2 contained those from whom the steroid was withdrawn from 1 week to 2 months before surgery; and group 3 patients did not receive steroids for the 2 months prior to surgery. For the CD patients, there was no demonstrable difference between the three groups in the incidence of operations without complications or the duration of the postoperative hospital stay. For the patients with UC, the incidence of complications, as well as the time in hospital, increased with increasing steroid treatment. Groups 1 and 2 did not differ significantly with regard to the duration of hospital convalescence ($p>0.05$), while this was the case for the groups 1-3 and 2-3 ($p<0.05$). The most frequent complications (wound infection, abscesses, fistulas, and pulmonary involvement) were related to the intensity of the steroid treatment for both disorders. Postoperative wound infections occurred more frequently in UC patients after high steroid doses than after low doses ($p<0.01$). The mortality rate, the duration of hospital convalescence, and the incidence of complications were significantly lower in patients who had undergone elective in preference to emergency surgery. It is concluded that the fear of an increased complication rate following intensive steroid treatment of patients with acute CD or UC is unfounded.

4577 NEUTROPHIL DYSFUNCTION IN CROHN'S DISEASE. (Eng.) Segal, A. W.; Loewi, G. (Royal Postgraduate Medical Sch., Du Cane Rd., London W12 OHS, U.K.). *Lancet* 2(7979):219-221; 1976.

The migration of neutrophils into skin windows was examined in 25 patients with Crohn's disease, in 31 patients with rheumatoid arthritis, and in 24 normal subjects. Neutrophils of the patients with Crohn's disease migrated out of skin windows over a 5-hr period in much smaller numbers (mean=0.25 ±

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0.15 x 10^6) than did those of the normal subjects (mean=1.3 ± 0.87 x 10^6) or those of patients with rheumatoid arthritis (mean=1.15 ± 1.13 x 10^6). This defect in Crohn's disease patients was unrelated to the site or extent of the inflammatory bowel lesions or to treatment. There was no statistically significant relation between the number of cells that migrated from skin windows in Crohn's patients and the ESR, serum albumin, hemoglobin, WBC count, or neutrophil count. Neutrophils from the Crohn's disease patients were normal on *in vitro* testing, indicating that the abnormal neutrophil function is secondary to a defective acute inflammatory response. Monocyte migration from skin windows after 24 hr was normal in the three patients with Crohn's disease that were investigated. A weak, acute inflammatory response to particulate or antigenic material in the bowel wall could result in the chronic inflammation observed in this condition.

4578 PERIPHERAL BLOOD AND INTESTINAL LYMPHOCYTE SUB-POPULATIONS IN CROHN'S DISEASE. (Eng.) Strickland, R. G.; Husby, G.; Black, W. C.; Williams, R. C., Jr. (Univ. New Mexico Sch. Medicine, Albuquerque, NM). *Gut* 16(11):847-853; 1975.

The nature and distribution of cells forming the inflammatory infiltrate in Crohn's disease were investigated in two patients by immunofluorescent techniques. Tissue from resected ileum (one patient) or colon (one patient) contained increased numbers of B and T lymphocytes compared with the corresponding control tissues. In tissue sections affected by Crohn's disease, immunohistological studies revealed a clear increase in lymphocytic infiltration in all layers of the bowel wall except within the superficial epithelium, and a difference in the distribution of T and B cells. In the mucosal lamina propria from either ileum or colon, a preponderance of B cells was observed. Sixty percent of the B cells were of the immunoglobulin (Ig) G class, 30% were of the IgA class, and 10% were of the IgM class. Only 25-30% of the lymphocytes in the lamina propria of the intestine involved by Crohn's disease were T cells. In the deeper layers of the bowel wall, T cells accounted for 60-70% of the lymphocytic infiltrate, while the proportion of B cells was 30-40%. Inflammatory cells bearing fragment crystallizable receptors were also present in the deeper layers of the bowel wall. Decreased peripheral blood T cell numbers returned to normal after resection of the involved bowel. These results are consistent with the view that many of the cellular immune abnormalities reported with varying frequency in Crohn's disease are secondary to immune intestinal sequestration and/or loss of lymphocytes.

4579 FOLIC ACID ABSORPTION IN REGIONAL ENTERITIS. (Eng.) Gerson, C. D.; Cohen, N. (Mt. Sinai Sch. Medicine, CCNY, New York, NY 10029). *Am. J. Clin. Nutr.* 29(2):182-186; 1976.

Intestinal absorption of folic acid by jejunal perfusion was investigated with a triple lumen tube in five patients with regional enteritis. The patients' intestinal disabilities ranged from terminal ileitis to short bowel syndrome. Two had steatorrhea and two had low serum folate levels. Labeled pteroylmonoglutamic acid (^{3}H-PGA) was added to the perfusion solution so that it contained total folic acid concentrations of 25 ng/ml with specific activity 0.04 μCi/ml. This resulted in perfusion of about 30 μg of PGA. Absorption of ^{3}H-PGA was in the normal range for all patients and slightly lower in two. Glucose absorption was also well maintained in all patients. The mean glucose concentration entering the study segment was 21 mM, and leaving the study segment, 7.1 mM, resulting in a logarithmic mean glucose concentration in the segment of 11.7 mM. Water and sodium absorption were in the normal range for four patients, although they were mildly depressed in a patient with the short bowel syndrome and recurrent disease. The results suggest that folic acid deficiency, common in regional enteritis, is largely caused by malnutrition, not malabsorption.

4580 RESULTS OF SURGICAL MANAGEMENT OF REGIONAL ENTERITIS (CROHN'S DISEASE). (Ger.) Pitzler, K.; Soelch, O.; Plog, I. (Chirurgische Klinik, Friedrich-Schiller-Universitat, DDR-69 Jena, Bachstr. 18, E. Germany). *Zentralbl. Chir.* 101(1):39-43; 1976.

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4584 IMMUNOSUPPRESSANTS IN THE TREATMENT OF CROHN'S DISEASE AND OF NONSPECIFIC ULCERATIVE COLITIS. (Rus.) Radbil', O. S. (All Union Scientific Research Inst. Medical and Medico-Technical Information, Moscow, USSR). *Klin. Med. (Mosk.)* 54(3):8-14; 1976.

See also, 3999, 4218, 4541.

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GASTROENTEROLOGY

ABSTRACTS
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CITATIONS

IATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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SUBJECT INDEX

The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED_{50}	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
μg	microgram(s)
Hz	Hertz
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K_m	Michaelis constant
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
μM	micromolar; micromole(s)
ma	milliampere(s)
mCi, μCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)
ml, μl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

4585 ULTRASTRUCTURE OF THE SURFACE PRINCIPAL CELLS OF THE LARGE INTESTINE IN POSTNATAL DEVELOPING RATS. (Eng.) Ono, K. (Iwate Medical Univ., Morioka 020, Japan). *Anat. Embryol.* 149(2): 155-171; 1976.

The principal cells of the surface of the cecum, the ascending colon, and the descending colon in 90 neonatal rats (aged 25 days or less) were investigated using both light and electron microscopy. In 1- to 14-day old rats, the ultrastructure of the surface principal cells in the cecum and ascending colon were characterized by apical tubulo-vacuolar systems and large supranuclear vacuoles similar to those previously reported in the absorbing cells of the neonatal ileum. After about the 16th day, the special membrane system disappeared. In the descending colon, this special membrane system was absent from the cytoplasmic matrix of the epithelium. The author proposes that the proximal portion of the large intestine, together with the distal part of the small intestine, actively participate in the absorption of protein molecules during the early postnatal period.

4586 PLASMA LIPOPROTEINS IN RATS WITH EXPERIMENTAL BILIARY OBSTRUCTION. II. AN ULTRASTRUCTURAL STUDY. (Eng.) Pasquali-Ronchetti, I.; Calandra, S.; Baccarani-Contri, M.; Montaguti, M. (Istituto di Patologia Generale, Universita degli Studi di Modena, Modena, Italy). *Biochim. Biophys. Acta* 409(1):13-25; 1975.

The ultrastructure of plasma lipoproteins was studied in male Wistar rats with acute biliary obstruction in an attempt to define the relation between the lipid composition and the ultrastructure of these macromolecules. Biliary obstruction was produced in some rats by ligation and transection of the bile duct. Plasma lipoproteins were obtained by sequential preparative ultracentrifugation. The density (d)<1.006 g/ml fraction was found to contain two types of particles: vesicles having a mean diameter of 42.0 nm and spheroidal particles having a mean diameter of 80.0 nm. The latter showed surface irregularities that made these particles appear as spherical bodies with holes. The d=1.019-1.063 g/ml fraction was heterogeneous. Gel filtration on 2% agarose allowed the characterization of three components designated subfraction I, II, and III, resp. Subfraction I was composed of large aggregates of spherical and vesicular particles. Subfraction II consisted of 50.0- to 80.0-nm vesicles that were similar to artificially prepared emulsions of phospholipids in water. Subfraction III contained particles having a mean diameter of 20.0 nm and resembled low density lipoproteins of normal rats. The d=1.063-1.125 g/ml fraction contained 35.0-nm discoidal particles that tended to form rouleaux with a periodicity of 4.9 nm. This fraction also contained a few vesicles and 10.0-nm spherical particles similar to those found in the corresponding fraction of the normal rat. The abnormalities of plasma lipoproteins of biliary obstructed rats are similar to those observed in familial plasma lecithin: cholesterol acyltransferase deficiency.

4587 RICINOLEIC ACID (CASTOR OIL) ALTERS INTESTINAL SURFACE STRUCTURE. A SCANNING ELECTROMICROSCOPIC STUDY. (Eng.) Gaginella, T. S.; Phillips, S. F. (Mayo Graduate Sch. Medicine, Univ. Minnesota, Rochester, MN). *Mayo Clin. Proc.* 51(1): 6-12; 1976.

The effect of sodium ricinoleate, the active principle of castor oil, on the mucosal surface structure was investigated in the rabbit small intestine. The ileum of eight male albino rabbits was perfused with isotonic buffer or buffer containing 10 mM sodium ricinoleate. Mucosal biopsies were examined by scanning electron microscopy. The smooth, uninterrupted, and uniform surface of the control villus tip was interrupted by a cleft of the tip after fatty acid treatment. Clefts were seen in 60% of villi exposed to ricinoleate, while no changes were seen with control buffer. Clusters of cells were found lying within a typical cleft. These cells measured between 4 and 8 μm in diameter and appeared to be covered by stunted microvilli. The surface of the villus had the appearance of cracked clay. These changes were seen in more than 70% of individual villi (N>400) and in all biopsies (N=5) obtained from treated animals. The changes were not seen to the same degree or extent in controls and were due to tufting of microvilli. The capacity of ricinoleate and dietary long-chain fatty acids to evoke fluid secretion in the intestine may be related to these changes.

4588 THE EFFECTS OF ALTERATIONS IN VILLUS SHAPE ON THE INTESTINAL MUCOSAL SURFACE OF THE ALBINO RAT; THE RELATIONSHIP BETWEEN MUCOSAL SURFACE AREA AND THE CRYPTS. (Eng.) Kapadia, S.; Baker, S. J. (Christian Medical Coll. Hosp., Vellore 632004, Tamil Nadu, India). *Digestion* 14(3):256-268; 1976.

The influence of alterations in villus architecture on villus surface area was studied in inbred albino rats, and the relationship at different ages (2 weeks to 8 months) between villus surface area and the crypts was investigated. The number of villi increased up to the third month of age, and the number of crypts increased up to the eighth month. In the proximal intestine, the mean length of the villus base increased up to the fifth month as ridge-shaped villi were formed. Villus height was greater proximally than distally, and this, and the crypt depth, remained constant from the end of the first month. The total villus circumference per unit area of intestine, and the villus circumference per crypt, were the same proximally and distally and were relatively constant after the first month. The total circumference of the crypt mouths per mm^2 of intestine was the same proximally and distally and was greater than the total villus circumference at all ages. The villus surface area per mm^2 of intestine or per crypt remained relatively constant after the first month and was greater proximally than distally, due only to the taller villi proximally. The change from finger-shaped to ridge-shaped villi did not affect the villus mucosal surface area. The changes in villus shape are probably not determined by differences in the rate of crypt cell production.

4589 A DEMONSTRATION OF MICROVILLI ON THE LUMINAL SURFACES OF EPITHELIAL CELLS OF THE CANINE EXTRAHEPATIC BILIARY TRACT.

(Eng.) Tansy, M. F.; Salkin, L. M.; Kendall, F. M.; Innes, D. L.; Martin, J. S. (Temple Univ. Health Sciences Center, Philadelphia, PA). *Surg. Gynecol. Obstet.* 141(5): 699-704; 1975.

To determine differences in cellular morphology in the length of the canine extrahepatic biliary tract, scanning electron microscopy (SEM) was performed at progressively higher magnifications on the luminal surfaces of epithelial cells from the extrahepatic biliary tracts of six adult mongrel dogs. The entire extrahepatic biliary tract was divided into four specimens of approximately equal length, and each specimen was opened by a longitudinal incision. The plicated surface of the intramural mucosa was characterized by prominent folds. The morphologic structure of the surface changed abruptly at the boundary of the intramural and extramural portions of the common bile duct. There were abrupt morphologic changes between the extramural common bile duct and the cystic duct, where mucosal folds again dominated the luminal surface and the hepatic duct. The mucosal surface of the hepatic duct was characterized by parallel ridges, longitudinally aligned with the long axis of the duct. The mucosal folds were covered with epithelial cells, which were arranged in an orderly fashion, producing a cobblestone appearance. At higher magnifications, the mucosal surface presented a cratered appearance, and dome-shaped cells lined its walls and bottom. The cells were covered with microvillous projections. The epithelial folds of the cystic duct were also covered with dome-shaped cells, which were in turn covered with dense populations of microvillous projections. SEM of the epithelial surfaces of the hepatic ducts showed dome-shaped cells with superficial microvillous structures. The gross architecture of the epithelial lining appears to be correlated with discrete portions of the ductal system.

4590 ULTRASTRUCTURAL CHANGES OF THE CANINE GASTRIC MUCOSA AFTER TOPICAL APPLICATION OF GRADED CONCENTRATIONS OF ETHANOL.

(Eng.) Dinoso, V. P., Jr.; Ming, S. C.; McNiff, J. (Hahnemann Medical Coll. Hosp., 230 North Broad St., Philadelphia, PA 19102). *Am. J. Dig. Dis.* 21(8): 626-632; 1976.

Changes in the fine structure of the gastric mucosa following exposure to graded concentrations of non-acidified ethanol solutions were studied in mongrel dogs; the concentrations of protein, sodium, and potassium in the gastric contents were also measured. Three hundred milliliters of 12.5, 20, and 40%, vol/vol ethanol, were instilled intragastrically for 30 min. Mucosa from the midbody and midantrum along the greater curvature was examined by light and electron microscopy. Ethanol produced a gradation of changes in the surface epithelial cells and in the lamina propria without affecting the parietal cells and chief cells. Widened and irregular intercellular spaces were seen after treatment with 12.5% ethanol, while 20 and 40% ethanol disrupted the apical cell membrane with concomitant exudation of mucin into the gastric lumen. These changes were more severe after 40% ethanol. The tight junction between cells remained intact following exposure to the lower concentrations of ethanol, but focal separation of cell junctions occurred in severely damaged areas. Thirty min after exposure to 12.5, 20, or 40% ethanol, the concentrations of protein (14.95, 33.59, and 42.56 mg/ml, resp.), sodium (14.25, 29.25, and 36.00 mEq/l, resp.), and potassium (0.80, 1.82, and 1.83 mEq/l, resp.) were increased over those before treatment (protein: 2.78, 3.75, and 7.35 mg/ml for 12.5, 20, and 40% ethanol, resp.; sodium: 2.50, 1.25, and 1.75 mEq/l, resp.; potassium: 0.15, 0.16, and 0.19 mEq/l, resp.). These studies provide additional morphological data on the relationship between structural changes and functional abnormalities induced by agents which break the gastric mucosal barrier.

4591 ASPIRIN-INDUCED ULTRASTRUCTURAL CHANGES IN HUMAN GASTRIC MUCOSA: CORRELATION WITH POTENTIAL DIFFERENCE.

(Eng.) Baskin, W. N.; Ivey, K. J.; Krause, W. J.; Jeffrey, G. E.; Gemmell, R. T. (Harry S Truman Veterans Admin. Hosp., Univ. Missouri, Columbia, MO 65201). *Ann. Intern. Med.* 85(3):299-303; 1976.

The effect of aspirin on the gastric mucosal barrier was studied in seven normal subjects, and changes in potential difference and ultrastructure were correlated. The mean control potential difference was -48 ± 1.0 mV. Aspirin (600 mg, p.o., in 100 ml of saline) reduced the mean potential difference to -39 ± 1.4 mV ($p<0.001$) within 10 min. Gastric biopsies were taken during the control, aspirin-instillation, and recovery periods. Damage was present in all biopsies after aspirin; light microscopy showed focal cell disruption, loss of mucous granules, and apical membrane rupture. Transmission electron microscopy showed intact tight junctions. Scanning electron microscopy showed the loss of normal cobblestone cell apices, giving a honeycombed surface. Ten min after aspirin ingestion, 25% of the surface epithelial cells were damaged. Marked recovery was noted at 1 hr, with a normal potential difference and only 9% cell damage. It is concluded that single, routine doses of aspirin cause focal damage to normal human gastric mucosa.

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4592 THE INFLUENCE OF THYROIDECTOMY AND OF TRIIODOTHYRONINE ADMINISTRATION ON EPITHELIAL CELL PROLIFERATION IN THE RAT JEJUNUM. (Eng.) Tutton, P. J. M. (Dept. Anatomy, Monash Univ., Clayton, Victoria, 3168, Australia). *Virchows Arch. (Cell Pathol.)* 20(2):139-142; 1976.

4593 STATUS OF THE INTRAMURAL NERVOUS APPARATUS OF THE VERMIFORM PROCESS IN CECUM MOBILE. (Rus.) Aivazian, V. P. (Erevan Railroad Hosp. with Clinic, Erevan, USSR). *Zh. Eksp. Klin. Med.* 15(6):70-76; 1975.

4594 FLUORESCENT HISTOCHEMICAL STUDY OF THE SYMPATHETIC INNERVATION OF THE LARGE INTESTINE OF SOME MAMMALS. (Rus.) Amvros'ev, A. P. (Inst. Physiology, Belorussian SSR Acad. Sciences, Minsk, USSR). *Arkh. Anat. Gistol. Embriol.* 69(8):47-51; 1975.

4595 MORPHOLOGY OF TRANSPLANTED LIVER. AN EXPERIMENTAL STUDY. (Ger.) Howanietz, L. F. (II. Chirurgische Universitatsklinik Wien, Spitalgasse 23, A-1090 Vienna, Austria). *Wien. Klin. Wochenschr.* 87(20):3-31; 1975.

4596 TRANSMISSION AND SCREENING ELECTRON MICROSCOPIC EXAMINATIONS ON THE INFLUENCE OF HYPOXIA ON THE LIVER SINUS ENDOTHELIA OF YOUNG AND OLD RATS [Abstract]. (Ger.) Frenzel, H.; Hucker, H.; Richter, I.-E.; Kremer, B. (Institut fur allgemeine unde experimentelle Pathologie der Bundeswehr, Mainz, W. Germany). *Verh. Dtsch. Ges. Pathol.* 59:446; 1975.

4597 MORPHOMETRIC INVESTIGATIONS ON DELOMORPHOUS CELLS OF THE RAT STOMACH DURING PROLONGED ALCOHOL APPLICATION [Abstract]. (Ger.) Al-Abadi, H.; Dumke, K.; Donhuijsen, K. (Pathologisches Institut, Freie Universitat Berlin, Berlin, W. Germany). *Verh. Dtsch. Ges. Pathol.* 59: 586; 1975.

See also, 4633, 4634, 4659, 4710, 4732, 4946, 5007, 5107, 5122.

ABSORPTION - EXCRETION - TRANSPORT

4598 ADAPTATION OF ELECTROLYTE AND WATER TRANSPORT IN THE CECUM. (Ger.) Loeschke, K. (II. Med. Univ.-Klinik, 8 Munich 2, Ziemssenstrasse 1, W. Germany). *Fortschr. Med.* 93(32):1613-1615; 1975.

To determine whether the intestine can adjust to specific changes in electrolyte transport, cecal wall changes were observed after addition of the polymer polyethylene glycol to the drinking water of rats. Cecal mass increased considerably, not through the enhancement of the size, but through increased numbers of mucosal cells. At the same time, Na-K-ATPase activity increased, suggesting that the rat cecal cells are able to adjust to changes in the electrolyte and water trnasport, not only with an increase in the number of cells, but also with a change in their functional properties.

4599 CALCIUM UPTAKE BY ISOLATED INTESTINAL BRUSH BORDER MEMBRANES FOLLOWING DIETARY CALCIUM RESTRICTION. (Eng.) Krawitt, E. L. (Dept. Medicine, Univ. Vermont, Burlington, VT 05401). *Life Sci.* 19(4):543-547; 1976.

Calcium uptake by isolated rat small intestinal brush border membranes was measured during the process of adaptation to dietary calcium deficiency. The administration of a calcium-deficient diet (0.01% calcium) for 10 days elevated the transport ratio in both everted duodenal and jejunal sacs ($p<.05$), in comparison to controls fed a diet containing 1.17% calcium. Activities of the marker enzyme, sucrase, indicated a comparable degree of purity of membranes from duodenum and jejunum isolated from both experimental and control animals; no statistically significant difference was observed comparing the values of activity from the duodenum (3.45 μmol sucrose split/min/mg protein) and jejunum (3.86 μmol) of controls to those of duodenum (3.18 μmol) and jejunum (4.9 μmol) of calcium-deficient animals ($p>0.05$). Uptake of ^{45}Ca by isolated membranes from the duodenum of calcium-deficient rats was elevated compared to the uptake by the membranes of controls, although no differences were seen in jejunal uptake rates. The results suggest that part of the adaptation producing increased intestinal transport by rats deprived of dietary calcium involves an increase in uptake by the duodenal brush border, independent of other components of the transport system.

4600 JEJUNAL XYLOSE AND GALACTOSE ABSORPTION IN THE RAT AS A FUNCTION OF INTESTINAL BACTERIAL FLORA AFTER THE ADMINISTRATION OF CYTOSTATICS. (Ger.) Bohmer, R.; Binder, R.; Rommel, K.; Dietrich, M.; Wolf, G. (Dept. Klin. Chemie, Zentrum fur Interdisziplinare Med., Univ. Ulm, D-7900 Ulm/Donau, W. Germany). *Z. Gastroenterol.* 14(1):30-40; 1976.

The correlation between xylose and galactose absorption in normal conventional rats, germ-free raised rats, and rats decontaminated with nonabsorbable antibiotics was investigated. Functional changes in the mucosa of the small intestine after administration of cytostatics were also examined. The monosaccharide absorption was determined by fractional small intestinal perfusion. No statistically significant differences in xylose absorption were seen between the three types of animals. Galactose absorption was decreased more significantly in germ-free rats than in the decontaminated rats. Three days after a single injection of cytostatics (daunorubicin hydrochloride, vincristine sulfate, or prednisone), xylose absorption was decreased in conventional and decontaminated animals compared to untreated rats. In the germ-free rats, xylose absorption was not affected by cytostatics, whereas galactose absorption was significantly elevated. In conventional and decontaminated animals, galactose absorption was unchanged after the administration of cytostatics.

4601 1-o-ACYL DERIVATIVES OF GLUCOSE AS NON-PENETRATING INHIBITORS OF GLUCOSE TRANSPORT BY HAMSTER SMALL INTESTINE IN VITRO. (Eng.) Ramaswamy, K.; Bhattacharyya, B. R.; Crane, R. K. (Univ. Texas Medical Sch. Houston, P.O. Box 20708, Houston, TX 77030). *Biochim. Biophys. Acta* 443(2):284-287; 1976.

The effect of 1-*O*-acyl derivatives of glucose on glucose transport was studied in everted sacs of hamster intestine. After 15 min incubation with 10 ml of a 1 mM solution of 1-*O*-propionyl glucose, 1-*O*-butyryl glucose, 1-*O*-henanoyl glucose, 1-*O*-octanoyl glucose, 1-*O*-decanoyl glucose, 1-*O*-dodecanoyl glucose, or 1-*O*-tetradecanoyl glucose, the concentration of acyl glucose in the tissue water was only 0.4, 1.9, 0.9, 0.5, 0.2, 0.2, and 0.9 mM, resp. The 1-*O*-acyl derivatives with 6, 8, 10, 12, and 14 carbon atoms inhibited the transport of 1 mM β-methyl glucoside by 24, 38, 81, 57, and 50%, resp. Using the representative compound, 1-*O*-decanoyl glucose, the inhibition was competitive with a K_m of 0.16 mM. The results show that the 1-*O*-acyl derivatives are nonpenetrating inhibitors. A carbonyl function in the substituent at C-1 renders the glucose derivative unable to be transported.

4602 ABSORPTION OF SHORT CHAIN FATTY ACIDS FROM THE HUMAN JEJUNUM. (Eng.) Schmitt, M. G., Jr.; Soergel, K. H.; Wood, C. M. (2300 North Rockton Ave., Rockford, IL 61101). *Gastroenterology* 70(2):211-215; 1976.

Jejunal absorption of the three predominant short chain fatty acids (SCFA), acetate, propionate, and butyrate, in small and large intestinal contents, was studied in five normal subjects to determine the association between excess SCFA production and diarrhea. A triple-lumen perfusion technique was employed; the test solutions were isotonic and contained 0, 5, 10, 25, 40, or 50 mM of an SCFA as the sodium salt. Intermittent secretion of small amounts of acetate (0.011-0.037 mmol/hr, cm) and butyrate (0.002-0.009 mmol/hr, cm) occurred during 3 of 15 control perfusion periods, and the concentrations measured in intestinal samples exceeded those reported for circulating plasma. The three SCFA's were absorbed rapidly and at equal rates. Absorption rates rose in apparently linear fashion, with the mean concentration in the study segment (up to 20 mM), but reached saturation at the higher concentrations present in the mixing segment. Water and sodium absorption increased slightly during butyrate absorption. The flow rate of fasting intestinal contents did not increase during SCFA perfusion. SCFA's are readily absorbed and do not exert a diarrheogenic effect in the normal human jejunum.

4603 EFFECT OF PREDNISOLONE AND SALICYLIC ACID ON IONIC FLUXES ACROSS THE HUMAN STOMACH. (Eng.) Ivey, K. J.; Parsons, C.; Weatherby R. (Royal Prince Alfred Hosp., Sydney, Australia). *Aust. NZ J. Med.* 5(5):408-412; 1975.

The effect of acute administration of prednisolone on ionic fluxes across the gastric mucosa was studied in five subjects; other experiments were carried out to determine whether prednisolone enhances the effect of salicylic acid on the mucosal barrier. Ionic fluxes were compared after instillation of test solutions of isotonic hydrochloric acid (160 mEq/l) alone or containing 20 mM salicylic acid or 10 mg of prednisolone, or both. Prednisolone produced no alteration in fluxes of H^+ and Na^+ ions compared with controls. Salicylic acid induced a significant net loss of H^+ ions (mean, -0.78 mEq/15 min) and gain of Na^+ ions (+2.10 mEq/15 min), indicating alteration of the gastric mucosal barrier. Combined salicylic acid plus prednisolone produced no increase in permeability of gastric mucosa to H^+ and Na^+ ions or to salicylic acid itself. Prednisolone was not appreciably absorbed from the stomach (<2% of the amount instilled), while salicylic acid was well absorbed (16%). The combination of salicylic acid and prednisolone did not increase absorption of either drug. Neither salicylic acid nor prednisolone solutions alone or combined caused an increase in pepsin output over that due to 160 mM HCl. Salicylic acid resulted in a significant fall in potential difference compared to control (from -55 to -51 mV with salicylic acid alone; from -54.5 to -49.5 mV with salicylic acid + prednisolone), while prednisolone produced no change in the one subject studied. In acute studies in man, prednisolone is not absorbed from the stomach, does not itself affect the gastric mucosal barrier nor pepsin output, nor does it enhance the absorption of or effect of salicylic acid on gastric ionic fluxes or pepsin output.

4604 COMPARISON OF THE INTESTINAL ABSORPTION OF GLUCOSE AND MANNITOL DURING SLOW PERFUSION IN PHYSIOLOGICAL DOSES IN RABBITS [Abstract]. (Fre.) Coullaud, D.; Moreau, V. (Laboratoire de Physiologie, UER Medicale, 49000 Angers, France). *J. Physiol. (Paris)* 71(2):329A-330A; 1975.

4605 EFFECT OF VARIOUS COUMARINS ON THE INTESTINAL ABSORPTION OF GALACTOSE IN VIVO. (Spa.) Ruano, M. J.; Bolufer, J.; Larralde, J.; Lluch, M. (Departamento de Fisiologia Animal, Universidad de Navarra, Pamplona, Spain). *Rev. Esp. Fisiol.* 31(2):105-108; 1975.

4606 IN VIVO STUDY OF THE INTESTINAL ABSORPTION OF SACCHAROSE IN THE COURSE OF GROWTH IN THE RAT [Abstract]. (Fre.) Phan, H. H.; Hung, L. V. (E.R. 145, C.N.R.S., Laboratoire de Physiologie metabolique et Nutrition, 9, quai Saint-Bernard, 75230 Paris Cedex 05, France). *J. Physiol. (Paris)* 71(2):306A-307A; 1975.

4607 GLUCOSE TRANSPORT THROUGH THE PLASMA MEMBRANE OF ISOLATED HEPATOCYTES [Abstract]. (Ger.) Baur, H.; Heldt, H. W. (Institut fur Physiologische Chemie, Physikalische Biochemie und Zellbiologie der Universitat, Goethestr. 33, D-8000 Munich 2, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 357(3):249; 1976.

4608 EFFECT OF PENTOXYFYLLINE ON THE ORGAN DISTRIBUTION OF ^{47}Ca AND INTESTINAL Ca ABSORPTION AND SECRETION IN THE RAT. (Ger.) Kraft, D.; Schaefer, K. (Klinikum Steglitz der Freien Universitat Berlin, 1 Berlin 45, Hindenburgdamm 30, W. Germany). *Arzneim. Forsch.* 25(11):1794-1796; 1975.

4609 ALTERATION OF THE INTESTINAL TRANSFER OF CALCIUM [Abstract]. (Fre.) Dupuis, Y.; Fournier, P. (Metabolisme Mineral des Mammiferes [E.P.H.E.], Faculte de Pharmacie, Physiologie, 92290 Chatenay-Malabry, France). *J. Physiol. (Paris)* 71(2):280A; 1975.

4610 BILIARY TRANSFER OF SODIUM AND CHLORIDE. EXCRETION OF HIGH DOSES OF NaCl IN HYPOTHERMIA. (Fre.) Vanlerenberghe, J.; Trupin, N.; Nguyen, M. (Laboratoire de Physiologie, Faculte de Medecine, place de Verdun, 59045 Lille Cedex, France). *C.R. Soc. Biol.* 169(4):987-991; 1975.

4611 COMPARATIVE STUDY OF THE INTESTINAL ABSORPTION OF VARIOUS OILS IN THE RAT [Abstract]. (Fre.) Carlier, H.; Caselli, C.; Bernard, A. (Laboratoire de Physiologie Animale et de la Nutrition, U.E.R. Ensbana et Nutrition, 21000 Dijon, France). *J. Physiol. (Paris)* 71(2):269A-270A; 1975.

See also, 4702, 4719.

MOTILITY

4612 GASTRIC EMPTYING: TECHNIQUE OF MEASUREMENT AND SURGICAL IMPLICATIONS. (Eng.) van Dam, A. P. M.; Lubbers, E. J. C. (St. Radboud Univ. Hosp., Nijmegen, Netherlands). *Chir. Gastroenterol.* 9(4):453-456; 1975.

To determine the normal mean time of gastric emptying, 30 healthy subjects were given a test meal labeled with the technetium-antimony sulfur colloid, and the stomach was visualized by a gamma camera. In addition, the case reports of two patients in whom the gastric tracer study was valuable in the diagnosis of pyloric hypertrophy are presented. In the 30 subjects, the mean time in which half of the activity in the test meal left the stomach ($T_{1/2}$) was 47 min. In the two patients in whom radiological examination and gastroscopy failed to give evidence of pyloric hypertrophy, the $T_{1/2}$ values were greatly prolonged (122-240 min in one patient). Laparotomy and a successful pyloroplasty were subsequently performed. In both patients, the $T_{1/2}$ values were normal 3 months after the operation. Duplicate studies in 10 subjects demonstrated the reproducibility of the technique.

4613 SYNCHRONIZATION AND TIME SEQUENCE OF THE MOTILITY OF THE STOMACH, DUODENUM, BILIARY TRACT, AND PANCREAS. (Cze.) Klimov, P. K. (I. P. Pavlova Akademie ved SSSR, Leningrad, USSR). *Cesk. Gastroenterol. Vyz.* 29(3):176-183; 1975.

The coordination of motility of the stomach, duodenum, biliary tract, and pancreas of dogs was analyzed. During fasting, the organs underwent periodic transitions from relative rest to activity, with the electrographs showing only slow waves during rest and spike potentials during periodic hunger activity. A definite pattern of synchronization between the bioelectric activities of these organs which was temporarily disrupted (for 30-60 min) by pentagastrin administration (1-6 µg/kg, i.m.), was seen. At a dose of 1.0 µg/kg, pentagastrin had a brief (20-25 min) normalizing influence on disturbances in peristaltic activity and gastric evacuation following removal of the mucosa of the antral portion of the stomach. Removal of the duodenal mucosa resulted in a retarded evacuation, similar to so-called functional duodenal obstruction (duodenostasis). When administered to the dogs, the blood serum of human patients with this disorder induced inhibition of duodenal motility, widening of the duodenum, and a decrease in the amplitude of the slow electric waves. These findings, as well as data from the literature, are evidence of the union of two complex control systems, nervous and humoral, in a single regulatory mechanism.

4614 INTRALUMINAL PRESSURE OF THE SMALL INTESTINE OF THE UNANESTHETIZED DOG.

(Eng.) Tasaka, K.; Farrar, J. T. (Dept. Pharmacology, Faculty Pharmaceutical Sci., Okayama Univ., Okayama, Japan 700). *Pfluegers Arch.* 364(1):35-44; 1976.

The true pressures within the jejunun and ileum were determined in 14 unanesthetized dogs, and attempts were made to relate these pressures in one locus to those simultaneously occurring in adjacent and more distant loci. Intraluminal pressure recordings were performed in 14 unanesthetized dogs via a Mann-Bollman fistula by means of an air-filled balloon catheter system and a water-filled catheter system. Resting pressures in the proximal, middle, and distal jejunum averaged approximately 6 mm Hg above atmosphere, and no appreciable differences were noted between the different areas. The contraction time of simple, monophasic waves was fairly constant (approximately 1.0 sec in duration) and usually unrelated to the amplitude of the wave. Propulsion of intraluminal contents occurred in the absence of complex (type III) waves. A pressure wave in a proximal segment of the jejunum was temporally related to a wave occurring 5 cm distally. The mean intervals between the proximal and distal contractions were: 0.42 sec in the proximal jejunum, 0.74 sec in the middle jejunum, 1.56 sec in the distal jejunum, and 2.79 sec in the ileum. These time lags had a log normal distribution. The length of the physiologic segment in the jejunum of the dog varied from 1.0 to 8.0 cm and was usually 2-4 cm. The boundary of a segment varied from time to time, indicating that a segment is not a constant structure.

4615 A DOPAMINE RECEPTOR IN ESOPHAGEAL SMOOTH MUSCLE OF THE OPOSSUM.

(Eng.) de Carle, D. J.; Christensen, J. (Univ. Hosps., Iowa City, IA 52242). *Gastroenterology* 70(2):216-219; 1976.

The possibility that dopamine may play a role in nerve mediated "off" responses of esophageal body (EB) and relaxations of lower esophageal sphincter (LES) smooth muscle was examined in the isolated esophagus of the opossum. The effects of dopamine, epinine, and dopamine antagonists on EB and LES smooth muscle were also studied. Dopamine and epinine caused a dose-related fall in basal LES muscle tension and in amplitude of the EB muscle off response. The threshold dose for both was about 10^{-7} M, and maximal dose was about 10^{-4} M. At high concentrations, they also caused repetitive transient contractions of both LES and EB muscle after the period of inhibition. These effects were antagonized by haloperidol (10^{-5} M), and bulbocapnine (10^{-5} M), but were not influenced by propranolol (10^{-5} M) or phenoxybenzamine (10^{-5} M). Neither haloperidol nor bulbocapnine influenced responses to electrical field stimulation. Tetrodotoxin (10^{-7} M) abolished the responses to electrical field stimulation, but did not antagonize the effects of dopamine and epinine. EB and LES smooth muscle contain a dopamine receptor. It is unlikely that dopamine is involved in responses to electrical field stimulation.

4616 SYMPATHETIC NERVOUS CONTROL OF CAT ILEOCECAL SPHINCTER.

(Eng.) Pahlin, P.-E.; Kewenter, J. (Dept. Surgery III, Sahlgren's Hosp., 41345 Goteborg, Sweden). *Am. J. Physiol.* 231(2):296-305; 1976.

A perfusion method was designed to investigate the effects of stimulation of the splanchnic and lumbar colonic nerves on the ileocecal sphincter (ICS) of the cat. Splanchnic and lumbar colonic nerve stimulation at physiological frequencies (below 10-12 impulses/sec) elicited a contraction of the ICS concomitant with an inhibition of the motility of the adjacent parts of the small and large intestines. It appeared that the splanchnic and lumbar colonic nerves contract the ICS by a direct effect on the sphincter and not *via* a contraction of the intestine surrounding the sphincter. Guanethidine (3 mg/kg, i.v.) and phenoxybenzamine (5 mg/kg, i.v.), but not propranolol (1 mg/kg, i.v.), blocked the contraction of the ICS. It is suggested that the splanchnic and lumbar colonic nerves control the sphincter *via* an α-adrenergic mechanism. Inhibitory fibers were not found within the splanchnic or lumbar colonic nerves to the ICS. The excitatory response in the ICS elicited by adrenalin [0.1-2 γ/kg, intra-arterially (i.a.)], noradrenalin (0.9-7 γ/kg, i.v. or 0.1-4 γ/kg, i.a.), or phenylephrine (2-11 γ/kg, i.v. or 0.3-5 γ/kg, i.a.) infusion was completely blocked by phenoxybenzamine. Propranolol did not block the effect of these drugs on the ICS. An augmented response occurred, indicating unmasking of an excitatory α-receptor response by blockade of inhibitory β-receptors. Further support for these inhibitory β-receptors was provided by the finding that isoproterenol (3-14 γ/kg, i.v. or 2-10 γ/kg, i.a.) had a relaxing effect on the sphincteric muscle, an effect that was blocked by propranolol. To block the inhibitory effect on the small and large intestine elicited by splanchnic and lumbar colonic nerve stimulation, both phenoxybenzamine and propranolol had to be administered.

4617 EFFECTS OF CHOLINERGIC STIMULATION ON HUMAN ESOPHAGEAL PERISTALSIS.

(Eng.) Hollis, J. B.; Castell, D. O. (Naval Hosp., Portsmouth, VA 23708). *J. Appl. Physiol.* 40(1):40-43; 1976.

The effects of cholinergic stimulation on esophageal peristalsis were studied in 10 normal men. An intraesophageal transducer assembly was used to measure the dynamics of esophageal peristalsis before and after the i.v. injection of edrophonium chloride (80 mg/kg). Following edrophonium, there was a marked increase in the amplitude of esophageal peristalsis (from a mean ± standard error of

117 ± 13 mm Hg to 152 ± 17 mm Hg associated with a significant reduction in the velocity of esophageal peristalsis and a significant increase in the width and the time of appearance of the contraction wave following a swallow. Graded doses of edrophonium (20, 40, 80, and 160 μg/kg, i.v.) all resulted in significant increases in peristaltic amplitude, with the maximal response occurring at the two highest doses. Similar results were obtained with bethanechol (80 μg/kg, s.c.). The results indicate that cholinergic innervation is important in the regulation of esophageal motility.

4618 EFFECT OF INTRAVENOUS C-TERMINAL OCTAPEPTIDE OF CHOLECYSTOKININ AND INTRADUODENAL RICINOLEIC ACID ON CONTRACTILE ACTIVITY OF THE DOG INTESTINE.

(Eng.) Stewart, J. J.; Bass, P. (Univ. Texas Medical Sch. Houston, 6400 W. Cullen St., Houston, TX 77025). *Proc. Soc. Exp. Biol. Med.* 152(2):213-217; 1976.

The changes in ongoing digestive contractile activity after the intraduodenal administration of ricinoleic acid and the i.v. injection of the C-terminal octapeptide of cholecystokinin (CCK-OP) were studied in two dogs in which transducers had been implanted in the proximal jejunum, middle jejunum, terminal ileum, and proximal colon. CCK-OP produced a biphasic response when given as an i.v. bolus. At 50 ng/kg, there was an initial stimulation of digestive contractile activity in the proximal and middle jejunum, followed by a poststimulatory inhibition (PSI). At 500 ng/kg, there was a greater initial stimulation, followed by a longer PSI, and all areas of the intestine were affected (in contrast to the lower dose). Both repeated i.v. bolus injections of CCK-OP (50 ng/kg) and a single bolus injection of 500 mg of sodium ricinoleate produced the characteristic response of initial stimulation followed by poststimulatory inhibition. Repeated ricinoleic acid bolus injections produced increasingly diminished stimulatory responses. Atropine sulphate (100 μg/kg, s.c.) completely antagonized the motor effects of CCK-OP and ricinoleic acid. Hexamethonium (10 mg/kg, s.c.) only partially antagonized the effects of the ricinoleic acid. Because the motor actions of i.v. CCK-OP showed marked similarities to the responses evoked by the intraduodenal infusion of ricinoleic acid, the motor effects following infusion of a fatty acid into the proximal small intestine may result predominantly from the release of endogenous cholecystokinin.

4619 INTERACTION OF SOMATOSTATIN AND PENTAGASTRIN ON LOWER OESOPHAGEAL SPHINCTER PRESSURE (LESP) IN MAN.

(Eng.) Rosch, W.; Lux, G.; Schittenhelm, W.; Demling, L. (Dept. Medicine, Univ. Erlangen-Nurnberg, Krankenhausstr. 12, D-8520 Erlangen, W. Germany). *Acta Hepatogastroenterol.* 23 (3):209-212; 1976.

Because previous studies have suggested that somatostatin may be a hormone of the gastrointestinal tract, and because there are various interactions of gastrointestinal hormones in the control of lower esophageal sphincter pressure (LESP), the effect of somatostatin on basal- and gastrin-stimulated LESP was investigated in seven patients without diseases of the upper gastrointestinal tract. No change in LESP occurred after the administration of somatostatin (250 μg/hr, i.v.) under basal conditions, whereas the response to pentagastrin (0.6 μg/kg) was increased during the somatostatin infusion (67.0 ± 21.6 mm Hg) compared to the control period (47.0 ± 18.4 mm Hg, $p<0.01$). Somatostatin may act on LES inhibitory receptors that respond to pentagastrin.

4620 FURTHER STUDIES ON THE GANGLIONIC AND SMOOTH MUSCLE STIMULATING EFFECT OF POTASSIUM ON THE PERISTALTIC REFLEX OF THE GUINEA-PIG ISOLATED ILEUM.

(Eng.) Beleslin, D. B.; Samardzic, R. (Dept. Pharmacology, Medical Faculty, Beograd 11.000, P.O. Box 662, Yugoslavia). *Neuropharmacology* 14(10):769-777; 1975.

The effect of excess potassium ions on peristalsis was investigated in the isolated guinea pig ileum, and the mechanism of action was studied. Potassium (6.7-20.1 mM), acting from the serosal surface, produced two types of stimulating activity on the ileum, which was subjected to continuously raised intraluminal pressure. The first type of activity appeared in one-third of the experiments and consisted of full, strong and regular peristaltic waves. When potassium evoked this type of activity, the addition of hexamethonium (25.0-50.0 μg/ml), tetraethylammonium (25.0-50.0 μg/ml), dimethylphenylpiperazinium (2.5-10.0 μg/ml), or atropine (0.025-0.05 μg/ml) to the organ bath depressed the contractions of smooth muscles and caused small, irregular waves with incomplete relaxations between contractions. Eserine (0.002-0.003 μg/ml) potentiated this type of stimulating effect of potassium, while 0.33 mM potassium had no sensitizing action on the effect of 1.0 μg/ml of acetylcholine. In about two-thirds of the experiments, potassium caused the contraction of the longitudinal and circular muscle, which was followed by a few regular peristaltic waves. Thereafter, the peristalsis became irregular and was characterized by small and incoordinated waves with incomplete relaxation between contractions. 5-Hydroxytryptamine (0.25 μg/ml) and calcium (13.5-20.1 mM) applied to the serosal surface, transformed the small, irregular waves caused by potassium into regular peristaltic activity with full and strong peristaltic waves. Histamine (0.25-10.0 μg/ml) had no effect on this irregular activity. The stimulant effect of potassium did not remove the inhibitory action of ganglionic blocking agents, atropine, noradrenalin (1.0-5.0 μg/ml), adrenalin, 5-hydroxy tryptamine, or magnesium (1.4-2.7 mM), although it antagonized the peristaltic block caused by the addition of calcium to the organ bath. The interference of the direct effect of potassium on smooth muscle, with its action on myenteric ganglia, may cause small, irregular waves with incomplete relaxations between contractions. The results obtained with potassium and 5-hydroxytryptamine support the hypothesis that this amine acts on inhibitory neurones involved in the peristaltic reflex.

MOTILITY

4621 PHARMACOLOGICAL EFFECTS ON GASTRIC EMPTYING FOLLOWING LAPAROTOMY IN THE RAT.

(Eng.) Rentzhog, L.; Wikstrom, S. (Univ. Hosp., Uppsala, Sweden). *Acta Chir. Scand.* 141(7): 649-653; 1975.

The effect of metoclopramide, chlorpromazine, and neostigmine on postoperatively inhibited gastric emptying was investigated in male Sprague-Dawley rats. The gastrointestinal motility was analyzed 24 and 72 hr after laparotomy. Metoclopramide (3 mg/kg at 24 hr and 0.3 or 3 mg/kg at 72 hr), chlorpromazine (3 mg/kg at 24 hr and 0.1, 0.3, or 3 mg/kg at 72 hr), or neostigmine (0.1 mg/kg at 24 hr and 0.003, 0.01, or 0.1 mg/kg at 72 hr) was administered four times daily, s.c., beginning immediately after laparotomy. In the 24-hr series, 23.7% of the radioactive tracer was left in the stomach after 60 min. With metoclopramide, 11.9 ± 2.9% of the tracer was left in the stomach. There was no significant change in the rate of gastric emptying in rats given chlorpromazine and neostigmine (18.6 ± 4.0 and 21.8 ± 4.0, resp.) In the 72-hr series, there was no improvement in gastric emptying over the 24-hr series in controls and in animals given metoclopramide (0.3 mg/kg), chlorpromazine (all doses), or neostigmine (all doses). Metoclopramide (3 mg/kg) improved gastric emptying; only 6.8 ± 1.1% of the tracer remained in the stomach at 60 min. The results show that metoclopramide has an extremely marked accelerating effect upon gastric emptying following laparotomy.

4622 INFLUENCE OF SUBSTANCE P ON THE RESPONSE OF GUINEA PIG ILEUM TO TRANSMURAL NERVE STIMULATION.

(Eng.) Hedqvist, P.; von Euler, U. S. (Karolinska Institutet, Stockholm, Sweden). *Acta Physiol. Scand.* 95(3):341-343; 1975.

The influence of synthetic substance P (SP) on the responses of the longitudinal muscle layer of the guinea pig ileum to transmural nerve stimulation and to acetylcholine (ACh) was studied. Field stimulation single pulses (2 Hz, 1 msec) elicited a brisk muscle contraction, which was abolished by atropine (3×10^{-7} M) and left unchanged by guanethidine (3×10^{-6} M), phentolamine (6×10^{-6} M), and propranolol (7×10^{-6} M), indicating activation of cholinergic nerves. SP (1.5×10^{-10} M) enhanced the contraction response to transmural nerve stimulation and often increased the basal tone of the preparation. Increasing the dose (7.5×10^{-10} M) caused a dose-dependent increase in basal tone, whereas the enhancement of the induced contractions remained the same or increased moderately. SP in the same concentrations only occasionally and weakly enhanced contractions induced by 2.2×10^{-8} M ACh; sometimes the contraction response to ACh even decreased in the presence of SP. The finding that SP more readily enhances ileal muscle contractions caused by nerve stimulation than by ACh administration suggests a prejunctional action of SP on cholinergic transmission.

4623 DEXPANTHENOL (MOTILIN)--ITS RANGE OF ACTION AND ANALYSIS OF ITS ACTION.

(Ger.) Domschke, W. (Med. Univ.-Klinik, Krankenhausstr. 12, 8520 Erlangen, W. Germany). *Z. Gastroenterol.* 14:112-115; 1976.

4624 EFFECT OF POTASSIUM IONS ON RESPONSES OF THE RESISTANCE AND CAPACITANCE OF VESSELS OF SKELETAL MUSCLES AND INTESTINE.

(Rus.) Vilde, L. A. (Pavlov's Inst. Physiology, Acad. Sci. USSR, Leningrad, USSR). *Fiziol. Zh. SSSR* 61(10):1559-1563; 1975.

4625 MECHANISM OF THE NONADRENERGIC INHIBITION OF THE ELECTROMOTIVE ACTIVITY OF THE STOMACH.

(Rus.) Syromyatnikov, A. V.; Groysman, S. D.; Skok, V. I. (A. A. Bogomolets Inst. Physiology, Ukrainian SSR Acad. Sciences, Kiev, USSR). *Dokl. Akad. Nauk SSSR* 229(4):1014-1017; 1976.

See also, 4899, 5337.

SECRETION AND METABOLISM

4626 GASTROINTESTINAL METABOLISM OF CADMIUM IN EXPERIMENTAL IRON DEFICIENCY.

(Eng.) Valberg, L. S.; Sorbie, J.; Hamilton, D. L. (Dept. Medicine, Univ. Western Ontario, London, Ontario N6A 5A5, Canada). *Am. J. Physiol.* 231(2):462-467; 1976.

Studies were carried out in male C57BL/6 mice to further investigate the role of the gastrointestinal tract in cadmium metabolism and to compare the gastrointestinal handling of cadmium with iron. In addition the effect of iron deficiency on the absorption and rate of excretion of a p.o. dose of cadmium, the excretion of an s.c. dose of cadmium, and the distribution of cadmium throughout the gastrointestinal tract, after either a p.o. or a parenteral dose of cadmium, was determined. The average gastrointestinal uptake 4 hr after an intragastric dose of 400 nmol of labeled cadmium chloride ($^{109}CdCl_2$) in iron-deficient mice (fed a diet containing <2 mg iron/kg for 8 weeks) was 25%, which was significantly greater than the 16% uptake observed in animals fed a normal diet. More cadmium entered the body of the former group (3.8%), than the latter (2%, $p<0.05$). Between 4 and 72 hr, gastrointestinal radioactivity declined without further increase in body activity; more radiocadmium remained in the duodenum of iron-deficient than normal animals ($p<0.05$). The radiocadmium sequestered in the duodenum was bound to a protein with a molecular weight of about 12,000. After the s.c. injection of radiocadmium (200 nmol 0.3 μCi $^{109}CdCl_2$), the rate of excretion of radioactivity from the body was similar in iron-normal and iron-deficient mice; a greater proportion of the injected dose accumulated in the duodenum of the iron-deficient animals ($p<0.05$). The intestinal adaptive response to iron deficiency may enhance cadmium toxicity, whereas sequestration and subsequent excretion of cadmium by the intestinal mucosa serves to protect the body against toxic effects. The duodenum, particularly in iron-deficient mice, is especially vulnerable to the toxic effects of cadmium.

4627 EFFECTS OF ADRENERGIC AND CHOLINERGIC DRUGS ON CYCLIC ADENOSINE 3',5'-MONOPHOSPHATE AND ON α-AMYLASE SECRETION IN RABBIT PAROTID GLANDS IN VITRO [Abstract]. (Eng.) Schorderet, M.; Monnard, P. (Dept. Pharmacology, Sch. Medicine, Geneva, Switzerland). *Digestion* 13(1/2):124; 1975.

4628 INTERACTION OF GASTROINTESTINAL HORMONES ON SECRETORY PROCESSES [Abstract]. (Eng.) Grossman, I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Digestion* 13(1/2):112; 1975.

4629 INDOMETHACIN EFFECTS ON INTESTINAL SECRETION, PROSTAGLANDIN E AND CYCLIC AMP: EVIDENCE AGAINST A ROLE FOR PROSTAGLANDINS IN CHOLERA TOXIN INDUCED SECRETION [Abstract]. (Eng.) Hindi, S.; Wilson, D. E.; Tao, P.; Poppe, L. (Dept. Medicine, Univ. Illinois, Chicago, IL). *Clin. Res.* 23(4):481A; 1975.

4630 RECEPTOR CONTROL OF SECRETION OF OLD VERSUS NEW SECRETORY GRANULES IN RAT PAROTID SLICES [Abstract]. (Eng.) Schramm, M.; Sharoni, Y.; Eimeri, S. (Dept. Biological Chemistry, Hebrew Univ. Jerusalem, Jerusalem, Israel). *Biol. Gastroenterol. (Paris)* 9(1):77-78; 1976.

4631 INTRACELLULAR TRANSPORT OF SULFATED MACROMOLECULES IN PAROTID ACINAR CELLS. (Eng.) Berg. N. B.; Austin, B. P. (Div. Anatomy, Marquette Univ. Sch. Dentistry, Milwaukee, WI). *Cell Tiss. Res.* 165(2):215-225; 1976.

See also, 4608, 4731.

SECRETION AND METABOLISM

Stomach

4632 COMPARISON OF AMINO ACIDS BATHING THE OXYNTIC GLAND AREA IN THE STIMULATION OF GASTRIC SECRETION. (Eng.) Konturek, S. J.; Tasler, J.; Obtulowicz, W.; Cieszkowski, M. (Medical Acad., Cracow, Poland). *Gastroenterology* 70(1):66-69; 1976.

The ability of L- and D-isomers of amino acids bathing the oxyntic gland area to stimulate acid secretion was compared in four conscious dogs with Heidenhain pouch (HP), gastric fistula (GF), and pancreatic fistula (PF). Acid outputs from HP were determined by an intragastric titration method when amino acid solutions were perfused into HP at various concentrations, pH values, and distension pressures. The L-isomers of four essential amino acids, histidine, leucine, tryptophan, and phenylalanine, stimulated acid secretion, whereas D-isomers of these amino acids were completely inert in this respect. L-histidine among essential amino acids and glycine among nonessential amino acids exhibited the strongest stimulation of acid outputs, reaching 52 and 40%, resp. of the maximal response to histamine. Decreasing the pH of L-histidine solution perfused into HP in sequential order from 5.0 to 1.0 resulted in a stepwise reduction of acid output, falling at pH 1.0 to about 40% of the peak response achieved at pH 5.0. Local irrigation of HP by 2% xylocaine and the i.v. infusion of atropine (100 μg/kg/hr) or metiamide (2.9 mg/kg/hr) reduced, but did not abolish, HP response to chemical stimulation and the pH dependency of this response. It is concluded that only L- and not D-isomers of amino acids bathing the oxyntic gland area stimulate acid secretion by a local, gastrin-independent mechanism sensitive to distension pressure and pH.

4633 AN ELECTRON MICROSCOPIC STUDY OF THE DISTRIBUTION OF SODIUM IN NORMAL, PENTAGASTRIN-STIMULATED AND SECRETIN-INHIBITED FUNDIC MUCOSA OF THE STOMACH OF THE RAT. (Eng.) Kalahanis, N. G.; Nyhus, L. M.; Das Gupta, T. K. (Abraham Lincoln Sch. Medicine, Univ. Illinois, Chicago, IL). *Surg. Gynecol. Obstet.* 143(2):263-269; 1976.

Sodium localization was studied by electron microscopy in normal (untreated), pentagastrin (125 µg/kg, s.c.)-stimulated, or secretin (1 U/100 g, s.c.)-inhibited stomachs of 24 male Sprague-Dawley rats. Pieces of fundic mucosa were fixed either by perfusion or by immersion in an unbuffered osmium tetroxide-potassium pyroantimonate mixture (pH= 7.6). Both fixation methods gave comparable results. In the untreated tissue, sodium pyroantimonate crystals were mainly seen in and around the collagen fibers in the interstitium, and to a lesser extent, in the basal and lateral plasma membranes of the epithelial cells. No significant differences occurred in the secretin-inhibited tissue. In contrast, in the pentagastrin-stimulated rats, an increase in the amount of precipitate and a redistribution of the sodium pyroantimony deposits occurred; a larger amount of precipitate was seen toward and on the basal and lateral cell membranes, and the number of capillary pinocytotic vesicles containing the reaction product was greater. The amount of precipitate in the capillary lumen was also larger. The pyroantimonate technique seems promising for studying the mechanism of sodium transport in the gastric mucosa.

4634 EFFECT OF GASTRIN ON GASTRIC MUCOSAL CELL PROLIFERATION IN MAN. (Eng.) Hansen, O. H.; Pedersen, T.; Larsen, J. K.; Rehfeld, J. F. (Bispebjerg Bakke 33, DK-2400 Copenhagen NV, Denmark). *Gut* 17(7):536-541; 1976.

The effect of exogenous gastrin on cell proliferation kinetics in the gastric mucosa was studied in three normal subjects, and the relationship between the kinetic parameters and the serum gastrin concentrations was determined in 46 patients with different gastric diseases. Endoscopic biopsies were labeled *in vitro* with ^{3}H-thymidine, and autoradiographs were prepared. The percentage of DNA-synthesizing cells in the progenitor cell region was estimated. Sixteen hours after beginning the infusion of a large dose of pentagastrin (10 µg/kg/hr, i.v.), a marked increase in the labeling index occurred in the fundic mucosa of the normal subjects. The antral mucosa was not responsive to this effect. In the same subjects, infusion of a low dose of synthetic human gastrin I (8 ng/kg/min) did not affect the rate of cell proliferation, either in the fundic or in antral mucosa. In the patients with different gastric disease (13 with normal stomachs, 7 with duodenal ulcer, 5 with prepyloric ulcer, 6 with gastric ulcer, 5 with gastric cancer, and 10 with atrophic gastritis), no correlation between the serum gastrin concentrations and the labeling indices was found. The results suggest that the human fundic mucosa is responsive to a trophic action of pentagastrin. If it exists, a physiological action of gastrin as a trophic hormone for human gastric mucosa must be considerably more complex than previously believed.

4635 EFFECTS OF ETHANOL ON THE SECRETION AND MUCOSAL BLOOD FLOW OF A DENERVATED GASTRIC POUCH IN THE DOG. (Eng.) De Saint Blanquat, G.; Lamboeuf, Y.; Derache, R. (Groupe de Recherche sur la Toxicite des Aliments et des Boissons INSERM U.87, 2, rue Francois Magendie, 31.400 Toulouse, France). *Eur. J. Pharmacol.* 34(1):219-222; 1975.

Mucosal secretion and blood flow were measured in Heidenhain pouches in four dogs after the administration of ethanol (0, 0.25, 0.50, 1, and 2 g/kg, p.o.). Free acidity (1.13-1.96 mEq/hr), total acidity (1.64-2.79 mEq/hr), pepsin (2.73-2.93 mg/hr), and gastric mucosal blood flow (GMBF, 0.630-0.890 l/hr) were increased linearly at ethanol doses up to 1 g/kg; these levels were also raised at the 2 g/kg dose, but this level was always lower than the 1 g/kg dose. The GMBF to secretion ratio did not change with the dose, while the circulating blood volume required for the secretion of 100 µg of pepsin did. Significant dose-response regression lines ($p<0.05$) were observed for all secretory parameters, except pepsin, when the 2 g/kg dose was disregarded; the dose/GMBF regression was the most significant ($p<0.01$). The volume secreted and the acidity were correlated with GMBF, although pepsin secretion was not. The intragastric administration of 5 ml of water/kg was not followed by any secretion from the pouch, demonstrating that the distension induced by this volume was not sufficient to induce gastric secretion. The fact that the 2 g/kg dose of ethanol did not produce as marked a hypersecretory effect as the lower doses may be explained by previously reported studies, which showed that high ethanol doses modify ionic fluxes in the gastric mucosa.

4636 EFFECTS OF ETHANOL ON THE CYCLIC AMP SYSTEM OF THE DOG GASTRIC MUCOSA. (Eng.) Puurunen, J.; Karppanen, H.; Kairaluoma, M.; Larmi, T. (Dept. Pharmacology, Univ. Oulu, SF-90 220 Oulu 22, Finland). *Eur. J. Pharmacol.* 38(2):275-279; 1976.

The effect of ethanol on the cyclic AMP system of the canine fundic mucosa was studied *in vitro* to determine the mechanism by which ethanol influences gastric acid secretion. Ethanol (2.5%) increased the gastric mucosal content of cyclic AMP, whereas 10 and 20% ethanol decreased the mucosal content. The adenylate cyclase activity was increased by ethanol at 2.5 and 5%, but 10% ethanol did not significantly affect it. The activity of cyclic AMP phosphodiesterase was inhibited by ethanol in a competitive manner, the K_i value being 9×10^{-2} M, corresponding to an ethanol concentration of 5%. The increase in the gastric mucosal content of cyclic AMP, induced by low concentrations of ethanol, is apparently due to the stimulation of adenylate cyclase and inhibition of phosphodiesterase. Changes in the phosphodiesterase or adenylate cyclase activities do not explain the decrease of the mucosal content of cyclic AMP by higher concentrations of ethanol. Other studies have suggested that this decrease might be secondary to changes in the formation of prostaglandins.

4637 SUPPRESSION OF GASTRIC SECRETION AND SERUM GASTRIN BY GASTRIN ANTIBODY. (Eng.)

Villar, H. V.; Watayou, T.; Booth, R. A. D.; Rayford, P. L.; Reeder, D. D.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX 77550). *Am. J. Surg.* 131(1):64-68; 1976.

To elucidate the mechanism of antigastrin antibody (Ab_G)-induced gastrin inactivation *in vivo*, 14 dogs received varying doses of Ab_G, i.v. After a single dose of Ab_G (0.07 ml/kg), circulating gastrin levels could not be measured for as long as 47 days. Gastric secretion in response to food was not diminished by antigastrin antibody doses as high as 0.07 ml/kg daily for 10 days. Larger doses (0.2 and 0.4 ml/kg) produced a temporary reduction in gastric-stimulated gastric acid secretion. Mucosal levels of gastrin in the antrum, fundus, and duodenum were greatly increased (25,000-28,700, 102-176, and 302-378 ng/g, resp.) 10 days after injection of Ab_G (0.03 or 0.07 ml/kg). The levels in controls receiving normal rabbit serum were 9,200-16,400, 15.2-56, and 184-196 ng/kg in antrum, fundus, and duodenum, resp. The therapeutic use of antigastrin antibody to control gastric secretion does not seem feasible because of the scarcity of Ab_G and because large doses are required to obtain an only temporary effect.

4638 FURTHER EVIDENCE FOR AN INTESTINAL PHASE HORMONE THAT STIMULATES GASTRIC ACID SECRETION.

(Eng.) Orloff, M. J.; Charters, A. C., III; Nakaji, N. T. (Sch. Medicine, Univ. California, San Diego, CA 92110). *Surgery* 80(2):145-154; 1976.

An attempt was made to isolate the hormone responsible for the intestinal phase of gastric acid secretion. Extracts (110) of hog intestinal mucosa, each representing the yield from about 3,000 hogs, were prepared by a method for isolating small peptides that involved heating, absorption on diethylaminoethylcellulose, and acid precipitation. All extracts (2 mg protein, i.v., over 30 min) stimulated gastric acid secretion (basal level=1.00 ± 0.09; extract-stimulation=6.24 ±0.56, $p<0.001$) in gastric fistula from male Long-Evans rats; 56 extracts were highly active (greater than 50% increase in acid output above basal level in at least 60% of rats). Increasing doses of extract (0.002, 0.02, 0.2, 2.0, 5.0, and 10.0 mg, i.v., over 30 min) stimulated increasing acid production according to a regular dose-response relationship. Twelve highly active extracts were tolerated without side effects when infused into dogs with Heidenhain pouches and produced a mean 22-fold increase in acid output above basal. The gastrin content of 73 extracts measured by radioimmunoassay, averaged 5.80 ng per rat dose of extract, which is approximately 1/500 of the minimal stimulating dose of hog gastrin. No extract contained sufficient gastrin to produce an acid secretory response. Administration of the extract, together with a maximal stimulating dose of pentagastrin (600 μg, i.v.), in rats significantly augmented the maximal acid secretory response. The gastric secretory responses to the infusion of 27 highly active intestinal mucosal extracts (2 mg) into the inferior vena cava and into the portal vein were compared in rats with acute gastric fistulas. Systemic infusion produced a mean 2-hr gastric acid output of 9.56 ± 1.11 μEq, whereas portal venous infusion produced a secretion of only 2.48 ± 0.66 μEq, reflecting substantial inactivation of extract by the liver. There was marked inactivation of pentagastrin (2 or 20 μg) by the liver, but no hepatic inactivation of hog gastrin (20 μg). It is concluded that the extract had all of the known physiologic properties of the intestinal phase hormone and probably contained the intestinal phase hormone.

4639 EFFECT OF METIAMIDE ON ACID SECRETION FROM ISOLATED KITTEN FUNDIC MUCOSA. (Eng.)

Tepperman, B. L.; Schofield, B; Tepperman, F. S. (Div. Medical Physiology, Univ. Calgary, Calgary, Alberta T2N 1N4, Canada). *Can. J. Physiol. Pharmacol.* 53(6):1141-1146; 1975.

The effect of metiamide on acid secretion in the isolated kitten fundic mucosa was investigated *in vitro*. Two separate segments of stripped fundus were bathed in a Krebs-Henseleit solution to which pentagastrin (8.1 x 10^{-7} M), histamine (1.6 x 10^{-5} M), or acetylcholine chloride (10^{-4} M) had been added. Metiamide was injected into the bathing solution 30 min after the gastric excitant; the final bath concentration was 5.0 x 10^{-3} M. Metiamide suppressed the spontaneous secretion observed in five mucosal preparations; the mean response level in controls was 2.06 ± 0.16 μEq/cm^2/hr, and in test animals it was 0.59 ± 0.17 μEq/cm^2/hr ($p<0.05$). Metiamide strongly inhibited the acid response of the kitten mucosa to histamine, and to a lesser extent, to pentagastrin. Metiamide did not alter the response to repeated stimulation with acetylcholine. The results do not support the previously published conclusion that there is a general, nonspecific action of metiamide consequent upon blood flow effects.

4640 THE EFFECT OF METIAMIDE, AN H_2-RECEPTOR ANTAGONIST, IN THE PREVENTION OF EXPERIMENTAL STRESS ULCERS.

(Eng.) Safaie-Shirazi, S.; Foster, L. D.; Hardy, B. M. (Univ. Hosp., Iowa City, IA 52242). *Gastroenterology* 71(3):421-425; 1976.

Because of evidence that metiamide strongly inhibits gastric acid secretion, the hypothesis that metiamide will prevent bile salt-induced stress ulcers during hemorrhagic shock was tested. Forty dogs were bled and maintained for 4.5 hr at a mean blood pressure of 40-50 mm Hg. In group A, 10 dogs received 300 mg of metiamide p.o. 45 min before bleeding, and 10 dogs received normal saline. The pylorus was occluded before bleeding, and 10 ml of 15 mM bile salt were instilled into the stomach and aspirated at the end of 4.5 hr. The animals were killed after 48 hr; no ulcers were seen in the stomachs of dogs treated with metiamide. Sixty percent of the dogs in the untreated group developed multiple gross ulcers. In group B, the effect of metiamide on the disappearance rate of H^+ ions was measured by the instillation of 50 mM HCl plus 15 mM bile acid. No difference was noted in the rate of H^+ ion disappearance between metiamide-treated and control dogs. In five normotensive dogs, the rate of H^+ ion disappearance was identical before and after treatment with metiamide. Metiamide was effective in preventing stress ulcer in this experimental model, probably due to its inhibitory effect on H^+ ion secretion.

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4641 INHIBITION OF GASTRIC ACID SECRETION IN DOGS BY NEUROTENSIN.

(Eng.) Andersson, S.; Chang, D.; Folkers, K.; Rosell, S. (Dept. Pharmacology, Karolinska Institutet, 104 01 Stockholm 60, Sweden). *Life Sci.* 19(3):367-370; 1976.

The action of synthetic neurotensin on gastric acid secretion was studied in three dogs with gastric pouches to elucidate its possible physiological action. After approximately 30 min of neurotensin infusion (50 ng/kg/min, i.v.), pentagastrin-stimulated (1-1.5 μg/kg/hr, i.v.) gastric acid secretion was considerably inhibited. This inhibition reached maximal levels 60-90 min after the start of infusion, and the acid output returned to normal 60 min after the end of the infusion. In contrast, there was no inhibition of histamine-induced (1 mg/hr, i.v.) acid secretion. Neurotensin is a potent, selective, gastric secretory inhibitor.

4642 EFFECT OF FIFTY PERCENT SMALL BOWEL RESECTION ON GASTRIC SECRETORY FUNCTION IN RHESUS MONKEYS.

(Eng.) Moossa, A. R.; Hall, A. W.; Skinner, D. B.; Winans, C. S. (Pritzker Sch. Medicine, Univ. Chicago, 950 E. 59th St., Chicago, IL 60637). *Surgery* 80(2):208-213: 1976.

To investigate the relation between gastric hypersecretion and alteration of gastric function by disease or bowel resection, basal acid output (BAO) and histamine-stimulated acid output (MAO) were studied in 11 fasting rhesus monkeys before, and at 6 weeks, and 6 months after 50% distal small bowel resection. Serum gastrin and gastric inhibitory polypeptide (GIP) were assayed in eight monkeys. Highly significant increases were seen in BAO (0.37 ± 0.05 - 1.73 ± 0.37 mEq/hr; $p<0.005$) and MAO (1.7 ± 0.22-3.21 ± 0.45 mEq/hr; $p<0.01$) at 6 weeks. These levels persisted at 6 months. The ratio BAO to MAO increased from 0.231 to 0.505 at 6 weeks and to 0.61 by the end of the study. A significant rise was noted in the levels of both fasting serum gastrin (99.5 ± 14-148.4 ± 20 pg/ml, $p<0.05$) and GIP (664 ± 111-1,132 ± 88 pg/ml, $p<0.01$) during the early phase. By 6 months, the levels of both hormones had fallen and were not significantly different from the control values. It is concluded that 50% small bowel resection causes a persistent increase in gastric acid secretion with no corresponding sustained change in serum gastrin or GIP.

4643 REFLUX GASTRITIS: THE CONSEQUENCES OF INTESTINAL JUICE IN THE STOMACH.

(Eng.) Robbins, P. L.; Broadie, T. A.; Sosin, H.; Delaney, J. P. (Univ. Minnesota Health Sciences Center, 412 S.E. Union St., Minneapolis, MN 55455). *Am. J. Surg.* 131(1):23-29; 1976.

The consequences of the diversion of duodenal contents through the stomach was studied in six dogs to further investigate whether chronic gastritis is induced by exposure of the stomach mucosa to intestinal contents. The pylorus in six adult female mongrel dogs was excised, separating antrum from duodenum, and the distal stump was oversewn. The duodenum was divided again, proximal to the ligament of Treitz. The distal cut end was then anastomosed to the gastric antrum, and the proximal segment was drained end-to-side into the high gastric corpus. A year or more later, the mean gastritis grade for the corpus increased from approximately 2.7 to 6.0; in the antral mucosa, the mean score was 4.6 before the operation, and 7.5 at 8-24 months after the operation. Increases in parietal cell density were seen in four of six animals, and there was an enhanced maximal acid secretory capacity in three of six animals. No significant changes were seen in insulin-stimulated (0.5 U/kg) acid secretion, insulin-stimulated pepsin secretion, antral gastrin levels, or G cell numbers. It is concluded that chronic exposure of the intact stomach to duodenal contents results in gastritis and an amplified gastrin response to food.

4644 THE EFFECTS OF SEMISTARVATION AND PARENTERAL NUTRITION ON THE GASTRIC MUCOSA OF RATS.

(Eng.) Oram-Smith, J. C.; Rosato, E. F. (Univ. Pennsylvania Sch. Medicine, 3400 Spruce St., Philadelphia, PA 19104). *Surgery* 79(3):306-309; 1976.

The effects of semistarvation and of i.v. nutrition on the gastric mucosa were studied in 24 male Wistar rats (250-350 g) placed on one of three dietary regimens: group I, standard rat chow *ad libitum* (adequate p.o. intake); group II, 50 cm^3/day of a hyperalimentation solution containing 30% glucose plus 5% amino acids (adequate i.v. intake); and group III, 50 cm^3/day of 5% glucose (semistarved). After 7 days, gastric mucosal ion fluxes were measured following the gastric instillation of two gastric wash solutions, one containing HCl, and the other containing HCl and sodium taurocholate. The volume of gastric secretion was decreased in groups II and III (1.0-1.2 ml/hr and 0.7-0.8 ml/hr, resp.), in comparison to group I (1.9-2.1 ml/hr). The net negative hydrogen flux was increased in groups II and III (H/polyethylene glycol marker = -1.3 to -1.8 and -3.3 to -6.4 mEq/g, resp.) over group I (7.0 mEq/g). The net negative H^+ flux in group III was significantly increased over group II ($p<0.01$), but no difference in the volume of secretion was seen. Only group III demonstrated a difference in H^+ flux after the addition of sodium taurocholate (before: -3.3, after: -6.4; $p<0.005$). Gastric lesions were significantly increased in group III (gastric score, 18), as compared to groups I and II (score, 6 in both cases). There was no difference in sodium flux in the three dietary groups. The movement of lithium was independent of the movement of H^+ and did not serve as an indicator for H^+ back diffusion. The only group to demonstrate a negative lithium flux (-0.01/polyethylene glycol marker after the addition of taurocholate was group III. The results suggest that semistarvation renders the gastric mucosa more susceptible to injury, and that adequate parenteral nutrition alone protects against these effects.

4645 ACID-PEPSIN SECRETION IN THE RAT UNDER THE INFLUENCE OF VARIOUS GASTROINTESTINAL HORMONES. (Ger.) Schmidt-Wilcke, H. A.; Nawrath, G. D. (St. Franziskus-Hospital, II. Medizinische Abteilung, 44 Munster, Hohenzollernring 72, W. Germany). *Arzneim. Forsch.* 25(10):1596-1600; 1975.

4646 SIGNIFICANCE OF THE DEGREE OF VIGILANCE FOR GASTRIC ACID SECRETION AND FOR THE FUNCTION OF THE GASTROESOPHAGEAL SPHINCTER [Abstract]. (Ger.) Stacher, G. (No affiliation given). *Z. Gastroenterol.* 14:254-254; 1976.

4647 ADRENERGIC RECEPTORS AND CYCLIC ADENOSINE MONOPHOSPHATE IN REGULATION OF HYDROCHLORIC ACID SECRETION. (Rus.) Ivashkin, V. T.; Tikhonov, M. K. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Ter. Arkh.* 47(9):88-92; 1975.

4648 REGULATION OF HYDROCHLORIC ACID SECRETION WITH POTASSIUM. (Rus.) Ivashkin, V. T.; Kozhemyakin, L. A. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Sov. Med.* (2):21-26; 1976.

4649 RESTITUTION OF ACID SECRETORY FUNCTION AND CONTENT OF MUCOPOLYSACCHARIDASES IN THE DOG GASTRIC MUCOSA. (Ukr.) Rushkovs'kii, G. P.; Seniutovich, R. V. (Dept. Histology, Chernovtsy Medical Inst., Chernovtsy, USSR). *Fiziol. Zh.* 21(5):654-658; 1975.

4650 EFFECT OF VAGUS NERVE ON THE FREE AMINO ACID CIRCULATION BETWEEN THE STOMACH AND THE BLOOD. (Rus.) Aliev, A. I. (No affiliation given). *Dokl. Akad. Nauk. Azerbaidzhan SSR* 31(8):72-76; 1975.

4651 COMBINED ULCEROGENIC ACTION OF ALCOHOL, NICOTINE AND STRESS IN THE RAT [ABSTRACT]. (Ger.) Droszus, J.-U.; Dumke, K.; Schnoy, N. (Pathologisches Institut, Freie Universitat Berlin, Klinikum Charlottenburg, Berlin, W. Germany). *Verh. Dtsch. Ges. Pathol.* 59:585; 1975.

See also, 4659, 4709, 4725, 4734, 4858, 4907.

SECRETION AND METABOLISM

Pancreas

4652 ACTION OF CHOLECYSTOKININ, CHOLINERGIC AGENTS, AND A-23187 ON ACCUMULATION OF GUANOSINE 3':5'-MONOPHOSPHATE IN DISPERSED GUINEA PIG PANCREATIC ACINAR CELLS. (Eng.) Christophe, J. P.; Frandsen, E. K.; Conlon, T. P.; Krishna, G.; Gardner, J. D. (Univ. Brussels Medical Sch., 1000 Brussels, Belgium). *J. Biol. Chem.* 251(15):4640-4645; 1976.

The effects of the COOH-terminal octapeptide of cholecystokinin (CCK-OP) and related peptides, as well as carbamylcholine, on the accumulation of cyclic guanosine monophosphate (cGMP) were studied in dispersed acinar cells from Hartley guinea pig pancreas. The effects of the agents on the outflux of ^{45}Ca from these cells was also studied. Finally, the effects of the divalent cation ionophore A-23187 on these two processes were tested. CCK-OP and carbamylcholine each increased calcium outflux, cellular cGMP, and amylase secretion in the dispersed acinar cells. Following addition of CCK-OP or carbamylcholine, cellular cGMP increased as early as 15 sec, became maximal after 1-2 min, and decreased steadily during the subsequent incubation. For both CCK-OP and carbamylcholine, there was close agreement between the dose-response curve for stimulation of calcium outflux and that for increase of cellular cyclic GMP. With CCK-OP, an effect on both functions could be detected at 10^{-10} M, and maximal stimulation occurred at 3×10^{-8} M. With carbamylcholine, an effect on both functions could be detected at 10^{-5} M, and maximal stimulation occurred at 3×10^{-3} M. Atropine (10^{-9}-10^{-5} M) inhibited stimulation of both cGMP and calcium outflux by carbamylcholine, but not by CCK-OP. Stimulation of calcium outflux or cellular cGMP by CCK-OP or carbamylcholine did not require extracellular calcium, since stimulation occurred in a calcium-free, ethylene glycol bis (β,β-aminoethyl ether) *N,N'*-tetraacetic acid (EGTA)-containing solution. A-23187 (5×10^{-6} M) increased bidirectional fluxes of calcium, cellular cGMP, and secretion of amylase from dispersed pancreatic acinar cells. Like CCK-OP and carbamylcholine, the ionophore stimulated calcium outflux and cellular cGMP in a calcium-free, EGTA-containing solution. These results suggest that in pancreatic acinar cells, the initial step in the sequence of events mediating the action of ionophore, as well as that of CCK-OP and carbamylcholine, is stimulation of calcium outflux, and that this stimulation then increases cellular cGMP.

4653 PANCREATIC GASTRIN IN FOETAL AND NEONATAL RATS. (Eng.) Larsson, L.-I.; Rehfeld, J. F.; Sundler, F.; Hakanson, R. (Inst. Medical Biochemistry, Univ. Aarhus, Aarhus, Sweden). *Nature* 262(5569):609-610; 1976.

The cell type in which pancreatic gastrin is stored and the ontogeny of the rat pancreatic gastrin cell were studied. A large number of gastrin antisera, most of which were specific for the C-terminal bioactive sequence of gastrin-17, were tested on both unfixed and formaldehyde-fixed tissue. All antisera reacted with antral gastrin cells, but not with A_1 cells, suggesting that if gastrin-like peptides occur in the pancreatic A_1 cells, they must be devoid of the bioactive C-terminal sequence. At the 18th gestational day (the earliest stage studied), pancreatic gastrin-immunoreactive cells were seen both in islets and scattered among exocrine cells. The number of these cells increased up to day 4 after birth, when it slowly began to decrease. Only a few pancreatic gastrin cells, restricted to the duct epithelium, were observed in 12- to 20-day-old rats, and in rats older than 20 days, gastrin cells were almost never observed in the pancreas. A pattern similar to that in the pancreas was seen in the duodenum. Cells with an ultrastructure indistinguishable from that of the presumed gastrin cells (G cells) of rat antral mucosa were detected in the antral and duodenal mucosa and in the pancreas of 4-day-old neonatal rats. The distribution pattern and number of G cells were in agreement with that of the gastrin-immunoreactive cells. Gastrin immunoreactivity was observed in the duodenum (10.5 μEq synthetic human gastrin-17/g wet weight tissue) and pancreas (3.2 μg/g) of 4-day-old rats, while the level of antral gastrin was lower (0.9 μg/g). The concentration of antral gastrin in the adult rat was 18.4 μg/g. Gel-permeation chromatography revealed that gastrin immunoreactivity from the pancreas of 4-day-old rats eluted in the same pattern as gastrin from the antral mucosa of adult rats. The results indicate that gastrin cells appear first in the duodenum and pancreas, and only later in the antrum.

4654 EFFECT OF GASTRIN ON PANCREATIC ENZYME SECRETION AND GALLBLADDER EMPTYING IN MAN. (Eng.) Valenzuela, J. E.; Walsh, J. H.; Isenberg, J. I. (Univ. Chile Sch. Medicine, Casilla 6539, Santiago 4, Chile). *Gastroenterology* 71(3):409-411; 1976.

The effect of unsulfated synthetic human little gastrin (HG-17-I) on pancreatic secretion and gallbladder emptying was assessed in six normal men. During continuous gastric and duodenal aspiration, the subjects were given on different days either HG-17-I (7, 20, 60, 180, and 540 pmol/kg/hr over 40 min as a constant i.v. infusion), cholecystokinin (0.1, 0.3, and 0.9 U/kg/hr, i.v., over 40 min), or 238 pmol/kg (500 ng/kg) of HG-17-I as a rapid i.v. injection. Significant increases in trypsin output and bilirubin output above basal levels occurred during the infusion of both peptides. During HG-17-I infusion, the highest trypsin output (2.08 ± 0.22 Karmen U/10 min) and bilirubin output (4.66 ± 0.61 mg/10 min) occurred during the 60 pmol/kg/hr dose, whereas highest acid output occurred during the 540 pmol/kg/hr dose. Rapid i.v. injection of HG-17-I produced a prompt and significant rise in trypsin, bilirubin, bicarbonate, and acid outputs. It is concluded that HG-17-I produced significant pancreatic enzyme secretion and gallbladder emptying at doses that are submaximal for acid secretion, suggesting that this may be a physiological effect of gastrin.

4655 CELLULAR CYCLIC NUCLEOTIDES AND ENZYME SECRETION IN THE PANCREATIC ACINAR CELL. (Eng.) Haymovits, A.; Scheele, G. A. (Rockefeller Univ., New York, NY 10021). *Proc. Natl. Acad. Sci. USA* 73(1):156-160; 1976.

To investigate the roles of cyclic AMP (cAMP) and cyclic guanosine monophosphate (cGMP) in stimulus-secretion coupling in pancreatic acinar cells, the levels of these nucleotides were measured by radioimmunoassay in guinea pig pancreatic lobules incubated *in vitro*, during basal or stimulated secretion. Stimulation with optimal concentrations of carbamylcholine (carbachol, 10^{-5} M), pancreozymin (0.1 U/ml), and cerulein (10^{-9} M) resulted in a sharp rise in cGMP levels, from 5 to more than 20 times that of basal levels. cAMP levels did not change significantly. cGMP increases were maximal at 2 min, and then subsided by 4-7 min to a plateau about two to three times that of basal level. This plateau was maintained for the duration of the secretagogue stimulus. Removal of the carbachol stimulus resulted in a rapid decrease in cGMP levels to that of the basal state. The cellular cGMP levels observed within the first 2 min of stimulation correlated closely with the dose of carbachol and the secretory response. Atropine (10^{-4} M) blocked the cGMP elevation due to carbachol, but not due to pancreozymin, while carbonyl cyanide *m*-chlorophenyl hydrazone (10^{-4} M) blocked the response to both secretagogues. Similar results were obtained using rabbit pancreatic lobules incubated *in vitro*. High concentrations (10^{-2}-10^{-3} M) of the dibutyryl and 8-bromo analogues of both nucleotides were effective, although suboptimal, secretagogues. With the cAMP analogues, the secretory response was associated with an increase in endogenous cGMP levels, similar

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to that observed during suboptimal carbachol stimulation. These findings suggest that cGMP may be an intracellular mediator in the process of stimulus secretion coupling in the acinar cell of the exocrine pancreas.

4656 CYCLIC AMP IN PANCREATIC ACINAR CELLS: EFFECTS OF GASTROINTESTINAL HORMONES.

(Eng.) Gardner, J. D.; Conlon, T. P.; Adams, T. D. (Natl. Inst. Arthritis, Metabolism, Digestive Diseases, Natl. Inst. Health, Bethesda, MD 20014). *Gastroenterology* 70(1):29-35; 1976.

The effects of natural and synthetic gastrointestinal hormones, as well as other agents, on cellular cyclic AMP levels were investigated in acinar cells isolated from guinea pig pancreas. In the presence of theophylline (5 mM), secretin (10^{-7}), and vasoactive intestinal peptide (VIP, 10^{-6} M) each increased cyclic AMP in the acinar cells; secretin plus theophylline produced a fivefold increase in cyclic AMP, while the increase produced by VIP was 33% less. Without theophylline, neither peptide altered cellular cyclic AMP. Glucagon (10^{-5} M) neither stimulated cellular cyclic AMP nor inhibited the stimulation produced by secretin or by VIP. Other agents that did not increase cellular cyclic AMP were cholecystokinin (10^{-5} M), the carboxyl-terminal octapeptide of cholecystokinin (10^{-5} M), synthetic gastrin I or II (10^{-5} M), bovine pancreatic polypeptide (10^{-5} M), carbamylcholine (10^{-4} M), and prostaglandin E_1 (10^{-3} M). Neither carboxyl-terminal octapeptide nor gastrin I altered the stimulation of cellular cyclic AMP produced by secretin or VIP. With natural secretin, a significant increase in cellular cyclic AMP was detected at concentrations as low as 3 x 10^{-10} M, and maximal stimulation occurred at 10^{-8} M. VIP was approximately 1% as potent as natural secretin, and maximal concentrations of secretin plus VIP increased cellular cyclic AMP to the same value as that obtained with a maximal concentration of secretin alone. These results indicate that pancreatic acinar cells possess receptors for VIP and for secretin that do not interact with glucagon.

4657 EXOCRINE FUNCTION OF PANCREAS IN CHRONIC HYPOCALCEMIA. STUDIES IN PARATHYROIDECTOMIZED RATS.

(Ger.) Heidbreder, E.; Kappel, W.; Heidland, A. (Medizinische Universitatsklinik, D-87 Wurzburg, Josef-Schneider-Str. 2, W. Germany). *Res. Exp. Med. (Berl.)* 165(2):93-99; 1975.

To study the effect of chronic hypocalcemia on the exocrine pancreatic function, parathyroidectomy was performed on 9 Wistar rats; 10 rats served as controls. Fourteen to 21 days after parathyroidectomy, the amount of pancreas secretion was measured, and the flow rate calculated. Total calcium, alpha amylase, urea nitrogen, blood chemistry, bicarbonate, and hemoglobin were determined. Changes after chronic calcium depression were less marked then in acute hypocalcemia. The flow rate was higher in the parathyroidectomized rats (7.9 ± 0.5 µl/min after 50 min, decreasing to 6.9 µl/min after 2 hr) compared to the controls (6 µl/min, decreasing to 5.6 ± 0.9 µl/min). The difference was statistically significant ($p<0.01$). Total pancreatic calcium secretion, if related to the flow rate, showed very similar curves for both groups. Calcium concentration values were significantly lower ($p<0.01$) in the parathyroidectomized rats, but showed no statistically significant difference compared to the controls, if related to the flow rate. Alpha amylase concentration and secretion were initially increased, but not altered altogether. Although the results of this study indicate no significant change of exocrine pancreatic function in chronic hypocalcemia, it could not be determined if and when a continued extracellular calcium decrease would lead to exocrine insufficiency *in vivo*.

4658 ATROPINE-INDUCED INHIBITION OF THE ENHANCED CCK RELEASE OBSERVED IN ALCOHOLIC DOGS.

(Eng.) Voirol, M.; Bretholz, A.; Levesque, D.; Laugier, R.; Tiscornia, O.; Sarles, H. (Hopital universitaire, Unite de Gastroenterologie, Medecine I, Boulevard de la Cluse, Geneve, Switzerland). *Digestion* 14(2):174-178; 1976.

Experiments were carried out to determine whether the previously observed increased pancreatic secretory response to oleic acid in alcoholic animals is caused by a cholinergic nerve-mediated increase in the release of cholecystokinin (CCK). Two dogs with a Thomas cannula were given ethanol (2 g/kg/day) intragastrically for 3 yr, and four nonalcoholic dogs with a cannula were used as controls. The increased secretory response in the alcoholic dogs was confirmed by these experiments. Oleic acid (20 ml) was instilled intraduodenally 20 min after a secretion plateau was reached during secretin infusion (1 CU/kg/hr, i.v.). When atropine (0.75 mg/kg/hr) was added to the infusion, the protein output in both alcoholic and nonalcoholic dogs was significantly decreased. However, the difference in output between the alcoholic and nonalcoholic dogs, seen after oleic acid administration when secretin was infused alone, was abolished by atropine; the oleic acid-elicited peak protein response (35 mg/20 min) was identical in alcoholic and nonalcoholic animals. The increased release of CCK in alcoholic animals following an intraduodenal infusion of oleic acid is under cholinergic control.

4659 GASTRIN IN THE PERINATAL RAT PANCREAS AND GASTRIC ANTRUM: IMMUNOFLUORESCENCE LOCALIZATION OF PANCREATIC GASTRIN CELLS AND GASTRIN SECRETION IN MONOLAYER CELL CULTURES.

(Eng.) Braaten, J. T.; Greider, M. H.; McGuigan, J. E.; Mintz, D. H. (Ottawa Civic Hosp., Ottawa, Ontario K1Y 4E9, Canada). *Endocrinology* 99(3):684-691; 1976.

The presence and development of immunoreactive gastrin (IRGa) in the fetal and neonatal pancreas and pyloric antrum of Wistar-Lewis rats were studied. IRGa appeared in the pancreas (0.9 ng/mg dry weight pancreas) and antrum (0.9 ng/mg dry weight antrum) at least as early as the 16th day of fetal life. Antral IRGa increased rapidly and continuously in the neonatal period (21 ng/mg in 5-day-old rats; 278

ng/mg in 35-day-old rats), while the pancreatic IRGa concentration increased and was maintained at a relatively constant level (3.25-3.6 ng/mg) from days 5 to 35. Monolayer cell cultures of the neonatal rat pancreas were used to evaluate the role of cyclic AMP-mediated release of gastrin. The addition of 4 mM $N^6,O^{2'}$-dibutyryl cyclic AMP or 4 mM theophylline to the culture medium induced significant release of gastrin (61.2 pg/dish/4 hr), compared to control cultures (15.0 pg/dish/4 hr). The stimulation of adenylate cyclase with cholera toxin (10 ng/ml) also resulted in significant gastrin release from a control level of 5.6 to a level of 72.0 pg/dish/hr. Long-term cultures (18-24 days) released gastrin continuously at a relatively constant rate. The cellular localization of pancreatic gastrin in 7-day-old cultures was performed by immunological techniques, using fluorescein-labeled antibodies to gastrin. The gastrin-containing cells were located at the periphery of most of the endocrine cell clusters. Immunofluorescence techniques for insulin and glucagon also showed that the alpha cells had a similar peripheral distribution, although they were more frequent in number. In contrast, insulin-containing cells were numerous and were present in all areas of the endocrine cell clusters. The studies support the following conclusions: that gastrin is present in the rat pancreas, even as early as late fetal life; that gastrin-producing cells are present and functionally competent in monolayer cell cultures of the neonatal rat pancreas for prolonged periods of time; that gastrin is released from these cells when intracellular levels of cyclic AMP are increased; and that the gastrin-producing cells in pancreatic cell cultures are located at the periphery of the endocrine cell clusters.

4660 EXPERIMENTAL IMMUNOPATHOLOGICAL INVESTIGATIONS OF THE EXOCRINE PANCREAS OF THE RAT [Abstract]. (Ger.) Richter, K. (Pathologisches Institut des Krankenhauses Nordstadt der Landeshauptstadt Hannover, Hannover, W. Germany). *Verh. Dtsch. Ges. Pathol.* 58:518; 1974.

4661 IN VITRO AND IN VIVO STUDIES ON THE EFFECTS OF CHOLECYSTOKININ ON PANCREATIC ENZYME SECRETION IN A PROPRANOLOL ENVIRONMENT. (Pol.) Kinalska, I.; Stasiewicz, J.; Szalaj, W.; Gabryelewicz, A. (Instytut Chorob Wewnetrznych AM, Bialystok, Poland). *Przegl. Lek.* 32(4):407-410; 1975.

4662 BICARBONATE AND CYCLIC AMP IN PURE HUMAN PANCREATIC SECRETION: DOSE-EFFECT CURVES WITH SYNTHETIC SECRETIN [Abstract]. (Ger.) Domschke, S.; Domschke, W.; Rosch, W.; Konturek, S. J.; Wunsch, E.; Demling, L. (No affiliation given). *Z. Gastroenterol.* 14:246-247; 1976.

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SECRETION AND METABOLISM

Hepatobiliary Tract

4663 SUBCELLULAR SITE OF ACETALDEHYDE OXIDATION IN THE RAT LIVER. (Eng.) Corral, R. J. M.; Havre, P; Margolis, J.; Kong, M.; Landau, B. R. (Case Western Reserve Univ. Sch. Medicine, Cleveland, OH 44106). *Biochem. Pharmacol.* 25(1):17-20; 1976.

An approach which utilized the stereospecificity of hydrogen removal in the oxidation of ethanol was used to study the site of formation of NADH during acetaldehyde oxidation in the liver. Slices of liver from white, female Sprague-Dawley rats were incubated with (R)ethanol-1-^3H (1-5 µCi) and (S)ethanol-1-^3H (1-5 µCi) at a concentration of 1 mg/ml and with ethanol-1-^{14}C (0.2-1.5 µCi) in a buffered medium. Uptake of the ethanol was about 50%. For (R)ethanol, the percent uptake of ^3H was similar to the percent uptake of ethanol determined enzymatically. That is, the ratio of ^3H to ^{14}C in the ethanol remaining at the end of incubation was similar to the ratio in the ethanol at the beginning of the incubation. In contrast, the uptake of ^3H from (S)ethanol-1-^3H was about half the uptake of ethanol, i.e., enrichment of ^3H in ethanol occurred, thereby increasing the ^3H:^{14}C ratio in ethanol following incubation. About four times as much of the uptake of ^3H from (R)ethanol-1-^3H as from (S)ethanol-1-^3H was recovered in lactate. About 60% of the ^3H from both isomers was recovered in water. More ^3H was recovered in acetaldehyde with (S) than with (R)ethanol-1-^3H. It is concluded that the (S)-hydrogen of ethanol has much less access to the NADH pool used in pyruvate reduction than does the (R)-hydrogen when the ethanol is metabolized by rat liver slices at concentrations of 1.0-0.5 mg/ml.

4664 THE INHIBITION OF LYSOZYME BY BILE ACIDS. (Eng.) Vantrappen, G.; Ghoos, A. Y.; Peeters, T. (Lab. Gastrointestinal Pathophysiology, A. Z. St. Rafael, 3000 Leuven, Belgium). *Am. J. Dig. Dis.* 21(7):547-552; 1976.

The *in vitro* effect of bile acids on the lysis of

Micrococcus lysodeikticus by lysozyme was studied. Lysozyme activity was assayed by following changes in the turbidity of a suspension. All of the bile acids tested inhibited the lysis of lysodeikticus by the lysozyme. Inhibition was dependent on bile acid concentration and the duration of its incubation with lysozyme, as well as on the properties of the specific bile acid. Conjugation with glycine or taurine increased the inhibition of all bile acids tested. Free chenodeoxycholic acid inhibited the lysozyme (at 0.5 mM) by 11% compared to 58% when conjugated with taurine. In general, sulfation increased the inhibitory effect of free bile acids more than their conjugates, and the di- and trisulfates were more inhibitory than the monohydrates; the inhibition with cholic acid was 11, 40, 49, and 63% with free, mono-, di-, and trisulfates, resp. The inhibition of micelle-forming bile acid was peaked and appeared to be related to the critical micellar concentration. Inhibition for the sulfated bile acids, which do not form micelles, was characterized by a plateau of maximal inhibition. It is suggested that bile acids may have an important influence on intestinal enzyme activity in general.

4665 INFLUENCE OF BILE SALT CHOLERESIS ON PLASMA DISAPPEARANCE AND BILIARY EXCRETION OF SOME ORGANIC ANIONS.

(Eng.) Vonk, R. J.; Meijer, D. K. F.; Mulder, G. J. (Dept. Pharmacology, State Univ. Groningen, Groningen, Netherlands). *Pharm. Weekbl.* 110(51/52):1312-1315; 1975.

The function of biliary micelles in biliary excretion was investigated by determining the phenolphthalein-β-D-glucuronide (PG), dibromosulphthalein (DBSP), and indocyanine green (ICG) excretion in male Wistar rats during taurocholate and dehydrocholate infusion (106 µmol/hr, i.v., in both cases). During the first 15 min after the i.v. injection of PG (200 µmol/kg), PG excretion was stimulated during bile salt infusion; this may have been due to a decrease of the biliary dead space transit time caused by choleresis. PG excretion was decreased during the final 60 min of dehydrocholate infusion and during the final 30 min of taurocholate infusion. During the entire 60-min observation period after the injection of ICG (12.9 µmol/kg), its excretion was markedly enhanced by taurocholate infusion; during dehydrocholate administration this stimulation was much less pronounced. Maximal biliary output of DSBP (75.0 µmol/kg) was stimulated during bile salt administration (75 min), and this was most pronounced when dehydrocholate was infused. The binding of ICG, DBSP, and PG to biliary micelles was studied by sedimenting the micelles using ultracentrifugation (140,000 x *g*, 210 min). The concentration of ICG was plotted versus the length of the centrifuge tube, and by simultaneous infusion of tritium-labeled taurocholate, the biliary micelles were marked. The sedimentation patterns of ^{3}H-taurocholate and ICG, DBSP, and PG were parallel, suggesting that most of the organic anions present in bile are associated with the micelles.

4666 CHOLERETIC EFFECT OF VASOACTIVE INTESTINAL PEPTIDE.

(Eng.) Thulin, L.; Hellgren, M. (Surgical Res. Lab., Karolinska Sjukhuset, Stockholm, Sweden). *Acta Chir. Scand.* 142(3):235-237; 1976.

The choleretic effects of an essentially pure form of the vasoactive intestinal peptide (VIP) were studied and compared with previously published results using a crude preparation of VIP (peptide mixture G2). Three dogs that had been fasted overnight and three dogs that had been fed 2 hr before the experiment, all of which had common duct fistulas and were anesthetized, received 10-min infusions of VIP (0.05 and 0.5 µg/kg/min, i.v.). In the fasted dogs, the average total bile output increased from 0.33 g/10 min before the infusion to 0.96 g/10 min after the infusion. The average sodium output increased from 60 to 154 mmol x 10^{-3}/min, and the average amylase output increased from 110 to 203 U x 10^{-3}/10 min. The biliary concentration of sodium was unchanged, while that of amylase decreased. The bile output was essentially unaffected in the animals that were fed. The two doses used gave equal peak responses, but the duration of the effect was doubled or trebled following the highest dose. The results suggest that the choleretic action of VIP is equal to that of the previously reported peptide mixture G2.

4667 EFFECTS OF ACUTE ADMINISTRATION OF TAUROCHOLIC AND TAUROCHENODEOXYCHOLIC ACID ON BILIARY LIPID EXCRETION IN THE RAT.

(Eng.) Eaton, D. L.; Klaassen, C. D. (Univ. Kansas Medical Center, Kansas City, KS 66103). *Proc. Soc. Exp. Biol. Med.* 151(1):198-202; 1976.

The effects of taurochenodeoxycholate (TCD) and taurocholate (TCH) infusions on phospholipid and cholesterol excretion were studied in Sprague-Dawley rats. The bile acid pool was depleted by cannulating the common bile duct. Approximately 15 hr after cannulation, the lowest concentration of bile salt solution (0.78 mg/ml) was infused i.v. at 1.13 ml/hr for 2 hr; the bile salt concentration was increased gradually until a maximal infusion rate (4.3 µmol/min/kg in 25 mg/ml bile salt solution) was reached 28 hr after cannulation. Qualitative thin layer chromatography showed that the intensity of the spot corresponding to TCH decreased during the depletion period, while there was no TCD present until the infusion of TCD. No increase in the TCH fraction of bile acid excretion was evident during TCD infusion; therefore, the increase in total bile acids measured during TCD infusion was due to an increase in TCD excretion. The cholesterol excretion rate fell to 28% of its initial rate 15 hr after cannulation; this rate increased with infusion of each concentration of bile acid, but reached only 66% of the initial excretion rate at the maximal concentration. The rate of phospholipid excretion declined to 35% of its initial rate by the time bile acid infusion was begun; phospholipid excretion increased with each subsequent infusion of bile acid, attaining 125% of the initial rate at the maximal concentration. The bile acid excretion rate dropped to 25% of its initial rate in 8 hr and remained at this rate until bile acid infusion was begun; at the highest infusion rate, bile acid excretion was about 200% of the initial endogenous excretion rate. There were no statistically significant differences between the effects of TCH and TCD on bile acid excretion, phospholipid excretion, cholesterol excretion, or bile flow. Infusions of increasing concentrations of bile acids resulted in corresponding increases in cholesterol and phospholipid excretion, up to a bile acid excretion rate of 2 µmol/min/kg; above this rate, a plateau in cholesterol and phospholipid excretion rates was reached. The data on cholesterol levels during depletion and infusion of bile acids suggest that there are factors, in addition to bile acid excretion, which affect the cholesterol excretion rate.

4668 RAT LIVER MICROSOMES CATALYSE COVALENT BINDING OF ^{14}C-VINYL CHLORIDE TO MACROMOLECULES. (Eng.) Kappus, H.; Bolt, H. M.; Buchter, A.; Bolt, W. (Inst. Toxicology, Univ. Tubingen, D-74 Tubingen, Wilhelmstrasse 56, W. Germany). *Nature* 257(5522):134-135; 1975.

The suggestion that vinyl chloride (VC) may be transformed by the microsomal mixed function oxidase system to a reactive epoxide intermediate was tested further. When 1,2-^{14}C-VC was incubated with rat liver microsomes and an NADPH-regenerating system, the mean amount of VC metabolite binding to 1 mg of microsomal protein was 0.14 ± 0.07 (standard deviation) nmol; less than 0.001 nmol of VC metabolite was bound to microsomes in the absence of the NADPH-regenerating system. VC metabolites were also bound to albumin when it was added to the microsomal incubation. Concanavalin A, containing no cysteine, did not covalently bind VC metabolites, indicating that cysteine participates in the binding reaction. 1-Naphthyl-4(5)-imidazole (10^{-4} M) inhibited covalent binding by 85%, and 1 mM glutathione depressed binding by 30%. The incubation of ^{14}C-VC with a xanthine oxidase model system (10 mg albumin, 0.8 mM hypoxanthine, 8 mU xanthine oxidase, and 0.08 mM EDTA) for 60 min resulted in the binding of 12.6 ± 1.2 pmol of VC metabolites to 10 mg of albumin, when the system was taking up 10 nmol of ^{14}C-VC; no covalent binding to albumin occurred in control incubations containing albumin and 5 mM H_2O_2. This suggests that O_2-radicals convert VC to a metabolite, which then binds covalently to a protein-like albumin. These experiments support the concept of a reactive metabolite of VC involved in carcinogenesis and liver toxicity.

4669 CHANGES IN CHROMATIN DURING THE DEVELOPMENT OF LIVER CELL INJURY INDUCED BY GALACTOSAMINE. (Eng.) Weiss, E.; Gross, V.; Heinrich, P. C. (Biochemisches Institut der Universitat Freiburg im Breisgau, W. Germany). *FEBS Lett.* 64(1):193-196; 1976.

To investigate the mechanism of liver cell damage, the DNA, histones, nonhistone proteins, and RNA were analyzed in chromatin isolated from Wistar rat liver nuclei at 1, 3, and 6 hr after liver cell injury, similar to viral hepatitis, induced by the injection of D-galactosamine·HCl (GalN, 375 mg/kg). Although the total histone and DNA contents remained unchanged after the injection, chromosomal RNA,and nonhistone proteins were significantly decreased at 3 hr (0.077 md/mg DNA and 0.52 mg/mg DNA, resp.) and 6 hr (0.052 md/mg DNA and 0.59 mg/mg DNA, resp.) after GalN treatment, in comparison with controls (0.110 md/mg DNA and 0.80 mg/mg DNA, resp.). Sodium dodecyl sulfate-acrylamide gel electrophoresis demonstrated a quantitative and a qualitative difference in the pattern of nonhistone protein bands at 6 hr. Six hr after the i.p. injection of 1.0 mCi/kg of ^{3}H-leucine, there were marked decreases in ^{3}H-leucine incorporation into nonhistone proteins (specific radioactivity at 6 hr, 4,231) and into histones (2,482), in comparison to total liver proteins (40,330). These data suggest the following sequence of events toward cell death after GalN administration. The decrease in uridine triphosphate (UTP) levels leads to an impaired protein synthesis, either due to the lack of messenger RNA synthesis or to blocked translation. After the critical time of 3 hr, the regulatory important nonhistone proteins with a high turnover are lost, and the nonhistone protein/DNA ratio decreases. Because nonhistone proteins are necessary for gene activation, the important genes on the DNA cannot be transcribed.

4670 THE EFFECT OF D-GALACTOSAMINE AND URIDINE ON THE URACIL NUCLEOTIDE CONTENTS OF ISOLATED RAT HEPATOCYTES. (Eng.) Hofmann, F.; Decker, K. (Biochemisches Institut an der Medizinischen Fakultat der Universitat Freiburg, D-7800 Freiburg, Hermann-Herder Strasse 7, W. Germany). *Biochem. Soc. Trans.* 3(6):1084-1086; 1975.

To determine whether isolated rat hepatocytes are suitable for studies on metabolic pathways involving uracil nucleotides, the response of these cells to D-galactosamine and uridine was compared with that of the intact organ. The functional integrity of the hepatocytes was also monitored. The intracellular ATP, cytosine triphosphate (CTP), guanosine triphosphate (GTP), uridine triphosphate (UTP), and uridine diphosphate-glucose (UDP-glucose) remained in the range of concentration found *in vivo* and in the isolated perfused liver. The leakage of lactate dehydrogenase, glutamate dehydrogenase, glutamate-oxaloacetate transaminase, glutamate-pyruvate transaminase, iditol dehydrogenase, and nucleotide pyrophosphatase to the incubation medium was slightly increased in isolated cells compared with the isolated liver perfused with the same medium. D-galactosamine (4 mM) in the incubation medium decreased the contents of UDP-glucose and UTP to 10% of the normal values (0.24 ± 0.03 and 0.23 ± 0.06 µmol/g, resp.) within 30 min. The GTP and the ATP contents remained nearly constant, whereas intracellular CTP increased. The stimulation of the *de novo* synthesis of uracil nucleotides led to an increase in the total sum of the acid-soluble uracil nucleotides (ΣUMP=1.13-1.41 µmol/g in controls and 1.69-2.29 µmol/g in cells treated with galactosamine). D-glucosamine in the same concentration as D-galactosamine did not elicit a comparable change in the UTP content. Uridine (3 mM) doubled the UDP-glucose content within 200 min, whereas the UTP content increased fivefold. Hepatocytes treated with 4 mM D-galactosamine for 10 min recovered their UTP and UDP-glucose contents within 60 min after the addition of 3 mM uridine to the cell suspension. The metabolic integrity of the hepatocytes, and the close similarity of their response to both D-galactosamine and uridine, make these cells suitable for the studies of UTP- and UDP-sugar-dependent processes.

4671 CHANGES IN NUCLEOTIDE COMPOSITION AND ITS RELATIONSHIP TO MACROMOLECULAR SYNTHESIS IN COUMARIN-INDUCED HEPATOMEGALY.

(Eng.) Nievel, J. G.; (King's Coll. Hosp. Medical Sch., Denmark Hill, London SE5 8RX, U.K.). *Biochem. Soc. Trans.* 3(6):1241-1243; 1975.

The relationship between histochemical changes in glucose 6-phosphatase activity, nucleotide content, and macromolecular synthesis in the liver of coumarin-treated female Wistar rats was investigated. Toxic hepatomegaly induced by the chronic administration of coumarin increased both the concentration and the total amount of pyrimidine nucleotides in the liver. No such effect occurred after the administration of butylated hydroxytoluene or phenobarbitone, used as model inducers for nontoxic liver enlargement. With different doses of inducers, the effect on nucleotide content was apparently related to the toxic potential of the dose given. Glucose 6-phosphatase activity decreased during coumarin-induced liver enlargement, particularly when the enzyme was assayed biochemically. There was also a close correlation between the toxicity of coumarin and other biochemical changes in the liver, such as enhanced capacity of liver ribosomes to incorporate amino acids into protein, stimulation of the metabolism of drugs and other environmental chemicals or steroid hormones, inhibition of glucose 6-phosphatase activity, fat deposition in the liver, and hypertrophy of the endoplasmic reticulum in the cytoplasm. All of these changes can be induced by large doses of corticosteroids.

4672 EFFECT OF SMALL-INTESTINAL BYPASS ON HEPATIC LIPOGENESIS IN RATS.

(Eng.) Kaminski, D. L.; Jellinek, M.; Mueller, E. J.; Menz, L. (St. Louis Univ. Sch. Medicine, St. Louis, MO). *Surg. Forum* 26:395-397; 1975.

To determine whether the hepatic lipid accumulation following intestinal bypass is associated with an increase in hepatic lipogenic enzyme activity, the effect of bypass of 79% of the small intestine was studied in 10 Wistar rats maintained on a normal diet and in 10 obese rats maintained on an 18% fat diet. Ten nonoperated animals maintained on each diet served as controls. Electron microscopy revealed no hepatic lipid accumulation after bypass in the liver specimens of the rats on the normal diet, but steatosis was evident in samples from the obese rats after bypass. There were no alterations in hepatic glycolytic or Kreb's cycle enzymes after bypass in either the animals on the normal diet or those on the high-fat diet, except for increases in phosphofructokinase activity in both groups (normal diet: control=16.5 ± 1.6 mol/min/g, bypass=21.9 ± 1.8 µmol/min/g; high-fat diet: control=6.4 ± 1.6 µmol/min/g, bypass=20.1 ± 4.1 mol/min/g). The activity of the lipogenic enzymes, malic enzyme, glycerol phosphate dehydrogenase, and glucose 6-phosphate dehydrogenase, was significantly increased over controls in rats fed a normal diet and subjected to bypass (7.7 ± 1.5, 378 ± 10, and 4.8 ± 0.7 µmol/min/g, resp. for controls; 14.8 ± 3.0, 421 ± 17, and 8.1 ± 1.1 µmol/min/g, resp., after bypass). Only the activity of glucose 6-phosphate dehydrogenase in the rats on the high-fat diet was increased after bypass (0.3 ± 0.06 µmol/min/g in controls; 2.3 ± 0.05 µmol/min/g after bypass). The results suggest that increased hepatic lipogenesis does not have a significant role in the increased lipid accumulation associated with small intestinal bypass in rats.

4673 CHANGES IN HEPATIC BILE SECRETION FOLLOWING CHOLECYSTECTOMY.

(Eng.) Nahrwold, D. L.; Rose, R. C. (Milton S. Hershey Medical Center, Hershey, PA 17033). *Surgery* 80(2):178-182; 1976.

To determine whether canine hepatic bile secretion is altered by cholecystectomy, the volume and composition of hepatic bile was studied in nine anesthetized dogs before and approximately 18 weeks after operation. Dogs had common duct cannulation, cystic duct ligation, and temporary occlusion of the pylorus. Sodium taurocholate (9 µEq/min, i.v.) was infused during each experiment. Bile volume, electrolyte composition, bile salt output, and ^{14}C-mannitol clearance were determined during this infusion alone and after the addition of secretin (4 U/kg/hr). Cholecystectomy significantly increased bile volume, sodium, and chloride output, and ^{14}C-mannitol clearance, both in response to taurocholate alone and to taurocholate plus secretin. Bile salt output and bicarbonate output were unchanged. The study shows that cholecystectomy significantly alters the volume and composition of hepatic bile. The data indicate that cholecystectomy does not affect ductular function or hepatic secretion of bile salts, but that canalicular function is altered significantly.

4674 EFFECTS ON THE LIVER IN THE RAT OF INGESTION OF *Indigofera spicata*, A LEGUME CONTAINING AN INHIBITOR OF ARGININE METABOLISM.

(Eng.) Christie, G. S.; Wilson, M.; Hegarty, M. P. (Dept. Pathology, Univ. Melbourne, Parkville, Victoria 3052, Australia). *J. Pathol.* 117(4):195-205; 1975.

Liver lesions produced by indospicine were studied in Sprague-Dawley rats maintained on diets containing 96, 48, 24, and 15% of the seeds of the legume *Indigofera spicata*. The two higher levels caused death of most animals in 2-6 weeks. Initial experiments showed that females were more susceptible than males; in all subsequent experiments, females were used, and the experiments were terminated before death occurred. The rats fed the

24% seed diet developed a nodular cirrhosis by 6 weeks and survived up to 18 weeks. The rats fed the 15% seed diet developed cirrhosis at 16 weeks and survived up to 28 weeks. Prior to the onset of cirrhosis, the liver showed a characteristic lesion consisting of hepatomegaly, periportal fatty change, portal cellularity due to proliferation of ovoid and cuboidal duct cells, gross enlargement of the hepatocyte cytoplasm nuclei and nucleoli (in spite of brisk mitotic activity), and focal centrilobular necrosis. The lesion was interpreted as a restricted hepatic response to a growth stimulus, possibly the mobilization of tissue amino acids. Improvement occurred in the rats fed the two lower dosage levels after nodular cirrhosis developed, producing a new parenchyma. Liver sections were available from previous experiments in which a single dose of purified indospicine (1 or 2 g/kg) was administered to female rats; the similarity of the histological changes produced by the purified amino acid to those produced by the ingestion of the Indigofera seed diets indicated that the indospicine content of the seed was the major constituent responsible for its hepatotoxic effect.

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4675 IMPROVED LITHOGENICITY OF FASTING HEPATIC BILE BY DIETARY FIBER AND CHOLESTYRAMINE: STUDIES IN MICE AND HUMANS. (Eng.) Hall, R. C.; Klauda, H. C.; Waite, V. M.; Friedman, A.; Feher, J.; Tepperman, J. (State Univ. New York, Upstate Medical Center, Syracuse, NY). *Surg. Forum* 26:435-437; 1975.

The effect of fiber content in the diet and of cholestyramine on the lithogenic index (LI) was studied in mice and humans. After 4-6 weeks on either a synthetic nonfiber diet (with or without 1% cholestyramine) or a chow diet (with or without 1% cholesterol plus 1% cholic acid), half the mice were fed and half were fasted 18 hr prior to the creation of biliary fistulae for 1-2 hr. With the nonfiber diet, fasting failed to improve the LI, but the LI was significantly lowered by adding cholestyramine to the synthetic diet (LI=.31 in fed mice; .23 in fasted mice). This suggests that with fasting, intraluminal bile acid binding decreased, allowing increased reabsorption of bile acids. In five women (3 with gallstones), 14-hr fasting hepatic bile (duodenal juice before gallbladder contraction) and gallbladder bile (after contraction) were analyzed for LI before and 2-3, 6-9, and 8-12 weeks after cholestyramine (16 g/day) administration. Phenobarbital (120 mg/day) was added during the last 2 weeks. LI progressively decreased in all subjects. Bile acid-binding agents such as dietary fiber or cholestyramine should be studied further for their ability to prevent gallstones.

4676 HEPATIC TOXICITY IN THE RHESUS MONKEY TREATED WITH CHENODEOXYCHOLIC ACID FOR 6 MONTHS: BIOCHEMICAL AND ULTRASTRUCTURAL STUDIES. (Eng.) Dyrszka, H.; Salen, G.; Zaki, G.; Chen, T.; Mosbach, E. H. (Veterans Admin. Hosp., East Orange, NJ 07019). *Gastroenterology* 70(1):93-104; 1976.

To study the effect of p.o. chenodeoxycholic acid (10, 40, and 100 mg/kg/day) on hepatic function and morphology, biliary bile acid composition, and the reversibility of changes were investigated in 22 rhesus monkeys. After 6 months of treatment with 40 and 100 mg/kg/day, bile duct proliferation, portal tract inflammation and fibrosis, bile canalicular bleb formation, and hypertrophy of the smooth enodplasmic reticulum were associated with elevated serum levels of SGOT, SGPT, and leucine aminopeptidase. In the bile, the proportion of chenodeoxycholic acid and its bacterial metabolite, lithocholic acid, rose to approximately 85 and 10% of the total bile acids, resp. After chenodeoxycholic acid was withdrawn for 3 months, the hepatic morphological lesions persisted in some animals, although biliary bile acid composition returned to normal. No hepatic abnormalities were seen in the animals treated with 10 mg/kg/day. The findings suggest that long-term treatment of rhesus monkeys with high doses of chenodeoxycholic acid results in severe hepatic histological lesions that can persist after discontinuation of the bile acid.

4677 PRELIMINARY BIOCHEMICAL STUDY OF THE HEPATOTOXICITY OF TETRACHLORO-1,1,1,2-ETHANE IN WISTAR RATS. INFLUENCE OF SEX. (Fre.) Truhaut, R.; Thevenin, M.; Warnet, J.-M.; Claude, J.-R.; Phu Lich, N. (Centre de Recherches Toxicologiques, Universite Rene-Descartes, 4, avenue de l'Observatoire, 75270 Paris Cedex 06, France). *Eur. J. Toxicol.* 8(3):175-179; 1975.

4678 CHOLESTATIC EFFECT OF SODIUM TAUROCHOLATE (Na-TC) IN THE RAT IN VIVO [Abstract]. (Ger.) Herz, R.; Bradley, S. E. (No affiliation given). *Z. Gastroenterol.* 14:240-241; 1976. 241; 1976.

4679 ENERGY METABOLISM OF THE LIVER IN RATS FED DIETS CONTAMINATED WITH DITHIOCARBAMATES. (Fre.) Griffaton, G.; Faudemay, F.; Rozen, R.; Naon, R.; Lowy, R. (Laboratoire de Biologie, Conservatoire National des Arts et Metiers, 75141 Paris Cedex 03, France). *Ann. Nutr. Aliment.* 29(2):103-116; 1975.

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4681 FROM MICROLITHIASIS TO RADIOLOGICALLY INVISIBLE BILIARY LITHIASIS. (Fre.) Bories Azeau, A.; Dayan, L. (Service de Chirurgie "D," C.H.U. Clinique Saint Charles, F 34000 Montpellier, France). *Nouv. Presse Med.* 5(19):1260; 1976.

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(Central Res. Lab., Chair Operative Surgery, N. I. Pirogov II Medical Sch., Moscow, USSR). *Vopr. Med. Khim.* 21(5):481-485; 1975.

4683 THE EFFECT OF SILYBIN-DIHEMISUCCINATE ON REGULATION DISORDERS IN PHOSPHOLIPID METABOLISM IN ACUTE GALACTOSAMINE INTOXICATION IN THE RAT. (Ger.) Schriewer, H.; Lohmann, J.; Rauen, H. M. (Physiologisch-Chemisches Institut der Westfalischen Wilhelms-Universitat, 44 Munster, Waldeyerstr. 15, W. Germany). *Arzneim. Forsch.* 25(10):1582-1585; 1975.

4684 INHIBITION OF D-GALACTOSAMINE-INDUCED LIVER CELL DAMAGE BY D-FRUCTOSE APPLICATION [Abstract]. (Ger.) Rumpelt, H. J.; Bode, Ch. (Pathologisches Institut der Universitat Mainz, Mainz, W. Germany). *Verh. Dtsch. Ges. Pathol.* 59:455; 1975.

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4686 REVERSIBLE HYPERPLASIA AND HYPERTROPHY OF THE MOUSE LIVER UNDER FUNCTIONAL STRESS WITH PHENOBARBITAL. (Ger.) Bohm, N.; Moser, B. (Pathologisches Institut, Universitat Freiburg, Freiburg, W. Germany). *Verh. Dtsch. Ges. Pathol.* 59:457; 1975.

4687 INFLUENCE OF TANNIC ACID ON THE HEPATIC VITAMIN A LEVEL IN RATS KEPT ON WELL-BALANCED OR ON VITAMIN A-FREE DIETS. (Fre.) Suschetet, M. (Institut National de la Recherche Agronomique, Station de Recherches sur la Qualite des Aliments de l'Homme, B.V. 1540, 21034 Dijon-Cedex, France). *C.R. Soc. Biol.* 169(4):970-973; 1975.

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4689 ACTION OF ISOPROPANOL ON LIPID METABOLISM IN THE RAT: COMPLEMENTARY STUDIES ON THE MECHANISMS OF THE HEPATIC ACCUMULATION OF TRIACYLGLYCEROLS. (Fre.) Beauge, F.; Clement, M.; Renaud, G.; Nordmann, R.; Nordmann, J. (Groupe de Recherches de l'INSERM sur le Metabolisme Intermediaire [U72], Ecole Pratique des Hautes Etudes, Paris, France). *Arch. Int. Physiol. Biochim.* 83(3):573-591; 1975.

4690 EFFECT OF ETHYL ALCOHOL ON THIOACETAMIDE-DAMAGED RAT LIVER [Abstract]. (Ger.) Keiditsch, E.; Langer, E. (Pathologisches Institut des Stadtischen Krankenhauses Schwabing, Munich, W. Germany). *Verh. Dtsch. Ges. Pathol.* 59:587; 1975.

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4696 PHYSIOLOGY OF BILE SECRETION. (Ger.) Horak, W.; Grabner, G. (Ordinariat fur Gastroenterologie und medizinische Computerwissenschaften, Universitat Wien, Garnisongasse 13, A-1090 Vienna, Austria). *Acta Med. Austriaca* 2(3):73-81; 1975.

4697 ALPHA-FETOPROTEIN IN HUMAN HEPATOCYTE CULTURES [Abstract]. (Ger.) Nagamori, S.; Junge, U. (No affiliation given). *Z. Gastroenterol.* 14:266-267; 1976.

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4701 REGULATION OF CHOLESTEROL BIOSYNTHESIS IN SHAM-OPERATED AND REGENERATED RAT LIVER. (Eng.) Lee, B. Y. P.; Chan, Y. S. (Dept. Physiology, Univ. Hong Kong, Sassoon Rd., Hong Kong). *IRCS Med. Sci.: Cancer* 4(1):46; 1976.

See also, 4654, 4731, 4751, 4761, 5191, 5201.

SECRETION AND METABOLISM

Intestine

4702 METABOLISM OF ABSORBED ASPARTATE, ASPARAGINE, AND ARGININE BY RAT SMALL INTESTINE IN VIVO. (Eng.) Windmueller, H. G.; Spaeth, A. E. (Natl. Inst. Arthritis, Metabolism, Digestive Diseases, Natl. Inst. Health, Bethesda, MD 20014). *Arch. Biochem. Biophys.* 175(2):670-676; 1976.

L-[U-^{14}C]aspartate, L-[U-^{14}C]asparagine, and L-[U-^{14}C]arginine were administered luminally into isolated segments of rat jejunum *in situ,* and the radioactive products appearing in venous blood from the segment were identified and quantified. Aspartate (6 mM), administered alone or with 18 other amino acids plus glucose, was absorbed more rapidly than glutamate, but, as with glutamate, less than 1% was recovered intact in intestinal venous blood. Over 50% of aspartate carbon was recovered in CO$_2$, 24% in organic acids (mostly lactate), 12% in other amino acids (alanine, glutamate, proline, ornithine, and citrulline), and 10% in glucose, apparently the first demonstration of gluconeogenesis by the intestine *in vivo.* In contrast to aspartate and glutamine, less than 1% of asparagine was catabolized. About 4% of the absorbed dose was incorporated into the acid-insoluble fraction of the intestine, which was the case with all the amino acids studied. In conventional or germ-free rats, only 60% of arginine was absorbed intact, while 33% was hydrolyzed to ornithine and urea. The urea and 38% of the ornithine were released into the blood; the remaining ornithine was metabolized further by the intestine to citrulline, proline, glutamate, organic acids, and CO$_2$. Catabolism of several amino acids from the lumen, plus glutamine from arterial blood, may provide an important energy source in the small intestine.

4703 LOCALIZATION OF APOLIPOPROTEIN B IN INTESTINAL EPITHELIAL CELLS. (Eng.) Glickman, R. M.; Khorana, J.; Kilgore, A. (Beth Israel Hosp., 330 Brookline Ave., Boston, MA 02215). *Science* 193(4259):1254-1255; 1976.

Indirect immunofluorescence techniques were employed to determine the distribution of apolipoprotein B in rat intestinal epithelial cells. Isolated intestinal cells were prepared either during active lipid absorption or after biliary diversion. Specific immunofluorescence from an antiserum to apolipoprotein B was detected in the apical portion of epithelial cells from bile-diverted animals, demonstrating that a pool of apolipoprotein B is present in the nonabsorptive epithelial cell, and may be a component of intestinal cell membranes. During lipid absorption in normal rats, an early and sustained increase in immunofluorescence was demonstrated, consistent with an increased synthesis of apolipoprotein B during lipid absorption. This study demonstrates that apolipoprotein B is present within intestinal epithelium and provides evidence for the participation of this apoprotein in intestinal lipid transport.

4704 RAT INTESTINAL GLYCOLIPIDS. II. DISTRIBUTION AND BIOSYNTHESIS OF GLYCOLIPIDS AND CERAMIDE IN VILLUS AND CRYPT CELLS. (Eng.) Bouhours, J.-F.; Glickman, R. M. (Hopital Edouard-Herriot, 69374 Lyon Cedex 2, France). *Biochim. Biophys. Acta* 441(1):123-133; 1976.

To study the relation between changes in glycolipid composition and cellular growth in the intestinal epithelium, epithelial cells were isolated from rat intestine and grouped into villus and crypt cell fractions. Glycolipids from each cell fraction were purified and quantitated by fluorimetric determination of glycolipid sphingosine. Significant quantities of ceramide were found in all cell fractions, and accounted for approximately 15% of total glycolipid sphingosine. While villus and crypt cell fractions quantitatively contained differing amounts of sphingosine (4.6 and 1.6 μmol, resp.), all cell fractions contained proportionally similar quantities of sphingosine compared to cellular cholesterol or phospholipid. Individual glycolipids showed

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significant differences in distribution between villus and crypt cells. In villus cells, the hematoside content (3.8-17.7 nmol/100 nmol total sphingosine) and the glucosylceramide content were increased in comparison to those in the crypt cells (hematoside content, 3.8-5.7 nmol/100 nmol total sphingosine). The crypt cells showed an increase in trihexosylceramide (2.0-21.6 nmol/100 nmol sphingosine) and ceramide (26.0 nmol/100 nmol sphingosine) content in comparison to villus cells (1.6-13.6 and 15.9 nmol/100 nmol sphingosine, resp.). The rate of uridine diphosphate (UDP) glucose to hydroxy fatty acid ceramide glucosyltransferase was higher in villus cells, while the rate of UDP galactose to lactosylceramide galactosyltransferase was 3-4 times higher in crypt cells. Significant differences in both the distribution and biosynthesis of individual glycolipids occur in crypt and villus cells of rat intestine, which are of possible importance in the process of intestinal cell differentiation.

4705 GLUTATHIONE AND γ-GLUTAMYL CYCLE ENZYMES IN CRYPT AND VILLUS TIP CELLS OF RAT JEJUNAL MUCOSA.

(Eng.) Cornell, J. S.; Meister, A. (Cornell Univ. Medical Coll., New York, NY 10021). *Proc. Natl. Acad. Sci. USA* 73(2):420-422; 1976.

The intracellular concentration of glutathione, the activities of enzymes involved in glutathione metabolism, and the uptake of amino acids were studied in the villus tip cells and the crypt cells of the jejunal mucosa from male Sprague-Dawley rats. A micrometer planing technique was used to separate the epithelial cells, and thymidine kinase was assayed as a marker enzyme to verify the separation of villus tip and crypt cells. This activity increased sharply with increasing distance from the villus tip region. γ-Glutamyl transpeptidase exhibited an opposite activity pattern in the crypt-to-villus gradient, and thus appears to be a villus-specific enzyme. After fasting for 24 hr, the activity of this enzyme per milligram protein increased two- to threefold in both villus tip and crypt cells. No further change occurred in the villus tip cells after fasting for 48 hr or after the 24 hr-fasted animals were fed either protein (8.0 g gelatin, 10 g casamino acids, 400 ml water) or carbohydrate (cane sugar cubes) for 24 hr; the activity in the crypt cells increased moderately. The activities of γ-glutamyl cyclotransferase, γ-glutamyl cysteine synthetase, and glutathione synthetase were lower in the villus tip cells (650, 160, and 400 nmol/hr/mg protein, resp.) than in the crypt cells (1,500, 380, and 730 nmol/hr/mg, resp.). The concentration of glutathione in the crypt cells was 4.3 μmol/g wet tissue, while that in the villus tip cells was only 0.26 μmol/g. Fasting for 24 or 48 hr led to decreased glutathione levels in the villus tip cells (0.02 and 0.11 μmol/g, resp.) and the crypt cells (1.5 and 1.2 μmol/g, resp.). Feeding of carbohydrate after fasting was followed by a further decrease in glutathione (0.02 and 1.0 μmol/g in villus tip and crypt cells, resp.), but feeding protein increased the levels significantly (0.22 and 2.3 μmol/g, resp.). After the cells were incubated with a 30-50 mM radioactive amino acid solution, the uptake values for the villus tip cells were 20, 38, and 25 nmol/10^7 cells for methionine, valine, and glutamine, resp.; for the crypt cells, the respective values were 11, 9, and 16 nmol/10^7 cells. The results support the hypothesis that the transpeptidase, via the γ-glutamyl cycle, functions in amino acid transport; thus, the cycle is more important in relation to the function of the absorptive villus cells than to that of cells of the crypt.

4706 REGULATION OF RAT PROXIMAL INTESTINAL GLYCOLYTIC ENZYME ACTIVITY BY ILEAL PERFUSION WITH GLUCOSE.

(Eng.) Espinoza, J.; Clark, S. B.; Hritz, A.; Rosensweig, N. S. (Departmento de Nutricion y Tecnologia de los Alimentos, Universidad de Chile Sede, Santiago Sur, Santiago, Chile). *Gastroenterology* 71(2):295-298; 1976.

Since the specific activities of fructose-1-phosphate aldolase, fructose-1,6-diphosphate aldolase, and pyruvate kinase are higher in the rat duodenum and jejunum than in the ileum, the failure of dietary sugars to reach the ileum in high concentrations vis-a-vis this gradient was investigated. Wistar rats were fed a carbohydrate-free diet for 3 days, which removed the proximal-distal gradient of enzyme specific activities. Twenty percent glucose was then perfused directly into either the duodenum or the ileum for 3 days. The normal gradient of all three enzymes was restored by both proximal and distal glucose perfusions. Ileal pyruvate kinase was also increased by ileal glucose perfusion, but ileal aldolases were no higher after distal perfusion than after duodenal perfusion. Therefore, the low ileal aldolase levels normally found in fed rats are an intrinsic property of distal intestine and are not due to failure of dietary sugar to reach this portion of the gut. The adaptation of duodenal and jejunal glycolytic enzymes to ileal glucose perfusion suggests a humoral and/or neural mechanism, rather than a direct local luminal effect of the sugar itself.

4707 CIRCADIAN RHYTHMS IN DISACCHARIDASES OF RAT SMALL INTESTINE AND ITS RELATION TO FOOD INTAKE.

(Eng.) Saito, M.; Murakami, E.; Suda, M. (Sch. Medicine Ehime Univ., Shigenobu, Ehime 791-02, Japan). *Biochim. Biophys. Acta* 421(1):177-179; 1976.

To examine the mechanism involved in the circadian rhythm of disaccharidase activity observed in the rat small intestine, the effect of starvation on the maltase and sucrase rhythms was investigated in the jejunal mucosa of male Wistar rats. The activities of maltase and sucrase were low at night and high in the daytime in animals that had been fed from 09.00 hr to 15.00 hr for 2 weeks. Increases in disaccharidase activity were observed at 08.00 hr, 1 hr before the start of feeding. The rhythmic changes in disaccharidase activity continued for at least 2 days after starvation, but completely disappeared after 5 days of starvation. The disaccharidase rhythms may not be a direct consequence of food intake; anticipation of food intake may act as a trigger for initiation of the disaccharidase rhythms.

4708 LACK OF EFFECT OF ALCOHOL ON SMALL INTESTINAL BINDING OF THE VITAMIN B12-INTRINSIC FACTOR COMPLEX.

(Eng.) Findlay, J.; Sellers, E.; Forstner, G. (Hosp. Sick Children, 555 University Ave., Toronto, Ontario, Canada M5G 1X8). *Can. J. Physiol. Pharmacol.* 54(4):469-476; 1976.

To elucidate the mechanism of alcohol-induced vitamin B12 malabsorption, the absorption of ^{57}Co-labeled vitamin B12-intrinsic factor (IF) complex and its binding to mucosal precipitate and brush border fractions of the small intestine was studied in male Wistar rats. The rats were pair-fed with a liquid diet containing ethanol (5 g/100 ml, 35% of calories) or isocalorically substituted sucrose. IF was obtained from rats fasted for 18 hr, and for each trial, the minimum amount of vitamin B12 required to achieve maximum binding to IF was added. Rats fed alcohol exhibited hepatic steatosis, proliferation of the smooth endoplasmic reticulum, and disordered mitochondria after 6 weeks on the diet, and the absorption of vitamin B12 (fed with IF by stomach tube) was reduced significantly (mean ^{57}Co-B12 absorbed in controls=3,180 pg and in alcohol-fed animals=1,950 pg). In contrast, binding of ^{57}Co-labeled vitamin B12-IF complex to mucosal precipitate and brush border fractions was never less than that of fractions from control rats at 4, 8, and 12 weeks on the alcohol diet. Binding to the brush border was significantly greater in alcohol-fed rats at 12 weeks, whether expressed per unit of β-naphthylamidase activity or per mg of protein. Total mucosal sucrase and β-naphthylamidase were unchanged or slightly increased (β-naphthylamidase at 12 weeks) on the alcohol containing diet, indicating that the total brush border membrane was not reduced. Total brush border binding activity was the same in alcohol-fed and control rats at each time period. The results indicate that malabsorption of vitamin B12 in rats fed alcohol cannot be due to decreased binding of the vitamin B12-IF complex by brush border membrane receptors, or secondary to a net decrease in membrane receptors.

4709 EFFECT OF CHOLECYSTOKININ AND 16,16-DIMETHYL PROSTAGLANDIN E_2 ON RNA AND DNA OF GASTRIC AND DUODENAL MUCOSA.

(Eng.) Johnson, L. R.; Guthrie, P. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 70(1):59-65; 1976.

The effects of cholecystokinin-octapeptide (CCK-OP) and 16,16-dimethyl prostaglandin E_2 (16,16-dimethyl PGE_2) on DNA synthesis and on the RNA and DNA content of gastric and duodenal mucosa were examined in rats, and the response was compared to that elicited by gastrin. Twelve fasted male Sprague-Dawley rats were injected with either CCK-OP (20 μg/kg), 16,16-dimethyl PGE_2 (0.2 mg/kg), pentagastrin (250 μg/kg), or saline every 8 hr for 48 hr. The rats were killed, and the incorporation of [^{3}H]thymidine into DNA, as well as the total DNA and RNA content of the mucosa of the oxyntic gland area and the duodenum, were determined. Pentagastrin increased DNA synthesis 60% ($p<0.001$) in gastric mucosa and 90% ($p<0.001$) in duodenal mucosa, compared with rates for saline controls. Neither CCK-OP nor 16,16-dimethyl PGE_2 altered gastric mucosal DNA synthesis. Pentagastrin significantly increased the DNA and RNA content of both the gastric and duodenal mucosa. CCK-OP and 16,16-dimethyl PGE_2 caused a slight but significant increase in duodenal DNA synthesis. CCK-OP did not significantly increase the duodenal DNA content, and 16,16-dimethyl PGE_2 increased the duodenal RNA but not the DNA content. CCK-OP (20 μg/kg) in combination with pentagastrin did not alter the stimulation of gastric DNA synthesis, but significantly decreased the effect of pentagastrin on duodenal DNA. A dose of CCK-OP (370 μg/kg) equimolar to 250 μg/kg of pentagastrin did not stimulate DNA synthesis in either tissue and significantly inhibited stimulation by pentagastrin in both tissues. Low doses of CCK-OP (2.5, 5.0, 10.0, and 20.0 μg/kg) caused statistically significant increases in DNA synthesis and DNA content of the pancreas, but had no effect on either mucosa of the oxyntic gland area or duodenum. 16,16-Dimethyl PGE_2 did not inhibit the stimulation of DNA synthesis or the increases in DNA and RNA content stimulated by pentagastrin. The results suggest that moderate doses of CCK have a weak trophic effect in the duodenum but not in the stomach. Physiological doses of CCK-OP stimulated pancreatic DNA synthesis and increased pancreatic DNA content without affecting these parameters in the oxyntic gland area or duodenum in the same animals. The results also suggest that in the stomach and duodenum, CCK is not as potent a trophic hormone as gastrin and that it inhibits, probably competitively, the trophic effects of gastrin. 16,16-Dimethyl PGE_2 did not stimulate growth and did not interfere with the trophic response to gastrin even though it inhibits acid secretion. However, 16,16-dimethyl PGE_2 did increase the RNA content of the duodenal mucosa, indicating that it may stimulate activity resulting in hypertrophy.

4710 EPITHELIAL CELL LOSS IN REMAINING INTESTINE AFTER SMALL BOWEL RESECTION IN THE RAT.

(Eng.) Weser, E.; Tawil, T. (Univ. Texas Health Science Center at San Antonio, 7703 Floyd Curl Drive, San Antonio, TX 78284). *Gastroenterology* 71(3):412-415; 1976.

The DNA concentration in perfusates of proximal and distal bowel remnants of the resection of 50 cm of small intestine was measured and correlated with the changes of mucosal hyperplasia in male Sprague-Dawley rats. Sham-operated rats served as controls. One and six months after surgery, 50 cm of the remaining proximal or distal remnant were perfused with saline *in vivo*, and the perfusate DNA was assayed. The DNA recovered from the perfusate of the distal remnant was at least twice as much as that from control segments (1 month after surgery: 4.4 ng atoms DNA-P/min versus 2.3 ng in controls; 6 months after surgery: 2.7 versus 1.1 ng, resp.). This was associated with comparable increases in mucosal weight, DNA, and protein concentration per cm of distal remnant. No significant changes were found in perfusate DNA recovered from proximal remnants. This correlated with minimal, if any, changes in mucosal weight, DNA, or protein concentration per cm of these remnants.

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Increased desquamation of epithelial cells may reflect the hyperplasia of intestinal mucosa after bowel resection. Recovery of intraluminal DNA may prove useful as an index of intestinal adaptation.

4711 INTESTINAL HYPERTROPHY AFTER SMALL INTESTINAL BYPASS IN THE RAT. STUDIES ON METHODS AND REVERSIBILITY OF CHANGES. (Eng.) Fenyo, G.; Hallberg, D. (Dept. Surgery, Karolinska sjukhuset, Stockholm, Sweden). *Acta Chir. Scand.* 142(3):261-269; 1976.

Studies were conducted to determine if the hypertrophic changes occurring after jejunoileal bypass in the rat are reversible. A jejunoileostomy was created in female Sprague-Dawley rats, bypassing 85-90% of the small intestine, by means of a self-emptying blind loop. Control animals were subjected to laparotomy and suture-marking of five intestinal segments. At the end of the experiments, intestinal wet and dry weight and villus height were determined in the five different segments of the small intestine taken from both experimental and control animals. After 2 weeks, a significant hypertrophy occurred in the functioning part of the small intestine of the shunt-operated animals, while an atrophy occurred in the blind loop. In a shunt-operated group of animals, the normal anatomy was reestablished after 2 weeks, and the animals were sacrificed 4 weeks later and compared with controls and shunt-operated animals. In the reoperated animals, the hypertrophic changes disappeared and, except for the increased wet weight of one jejunal and one ileal segment (control: 128.8 and 106.9 mg/3 cm in jejunum and ileum, resp.; reoperated: 154.8 and 139.0 mg/3 cm, resp. $p<0.05$), there were no significant differences in comparison to control animals. The villus height did not differ significantly from that of the control animals, except for the second jejunal segment, which had lower villi in the reoperated animals (456 versus 415 μm, $p<0.05$). The experiments demonstrate that the hypertrophic changes of the small intestine of the rat, developing during the 2 weeks after establishment of a jejunoileal bypass, are reversible within 4 weeks.

4712 ACTIVATION OF HEAT-LABILE Escherichia coli ENTEROTOXIN BY TRYPSIN. (Eng.) Rappaport, R. S.; Sagin, J. F.; Pierzchala, W. A.; Bonde, G.; Rubin, B. A.; Tint, H. (Wyeth Labs., P.O. Box 8299, Philadelphia, PA 19101). *J. Infect. Dis.* 133(Suppl.): S41-S54; 1976.

The biological properties of a heat-labile enterotoxin from *Escherichia Coli* were investigated before and after treatment with trypsin. The possibility that proteolytic activation of the enterotoxin might play a role in the pathogenesis of the disease was considered. A vascular permeability factor (PF) was assayed by inoculating the enterotoxin intradermally to the shaved backs of New Zealand albino rabbits. The ability of the enterotoxin to stimulate growth hormone secretion was measured by monolayer cultures of rat pituitary cells. The secretory response was measured by a rabbit intestinal loop assay. Neutralization of the PF by antitoxin and by ganglioside G_{M1} was assayed in rabbit skin. PF was assayed *in vivo* by incubation in ligated rabbit intestinal loops. Trypsin treatment resulted in a 4- to 20-fold increase in PF activity of the enterotoxin. Trypsin treatment of cell filtrates from nontoxinogenic strains had little or no effect on PF. Trypsin-treated culture filtrates required about twice as much cholera antitoxin and about four times more *E. coli* antitoxin for PF neutralization than did control culture filtrates. At least 10 times more ganglioside G_{M1} was required to inactivate trypsin-treated culture filtrates than control filtrates. Trypsin treatment also increased the filtrate's ability to stimulate growth hormone secretion of rat pituitary cells 10-100 times. It was also about 10 times more active in altering the morphology of pituitary cells. The effects on morphology were indistinguishable from those produced by cholera toxin. There was no difference between control and trypsin-treated culture filtrates when compared in the rabbit intestinal loop assay. *In vivo* incubation showed an increasing PF titer from time zero for untreated filtrate, whereas the PF for trypsin-treated filtrate decreased to about 20%, 10 min after inoculation. These findings support the conclusion that, unlike cholera toxin, *in vivo* activation of *E. coli* enterotoxin by host proteolytic enzyme may play a role in the expression of full pathogenicity.

4713 THE ROLE OF THE SMALL INTESTINE IN CARBOHYDRATE METABOLISM. (Rus.) Berkman, R. A.; Yatsenko, I. V. (N. V. Sklifosovskii Moscow Scientific Research Inst. Emergency Aid, Moscow, USSR). *Fiziol. Zh. SSSR* 61(11):1697-1703; 1975.

4714 FREE PLASMA FATTY ACID METABOLISM IN THE SMALL INTESTINAL MUCOSA [Abstract]. (Ger.) Gangl, A. (No affiliation given). *Z. Gastroenterol.* 14:257; 1976.

4715 METABOLISM OF GLUCOSE BY CELLS OF THE AUERBACH PLEXUS IN NORMAL RATS. (Eng.) Mello de Oliveira, J. A. (Medical Sch. Ribeirao Preto, Ribeirao Preto [SP], Brazil). *Ann. Histochim.* 20(1):27-32; 1975.

4716 STUDY OF THE ACTIVITIES OF THE ENZYMES OF THE INTESTINAL MUCOSA NECESSARY FOR THE CONVERSION OF FRUCTOSE INTO GLUCOSE IN THE RAT [Abstract]. (Fre.) Crouzoulon, G. (Laboratoire de Physiologie Generale et Comparee, Universite Claude Bernard, Lyon I, 43, boulevard du 11-novembre 1918, 69621 Villeurbanne, France). *J. Physiol. (Paris)* 71(2):275A; 1975.

4717 EFFECT OF HIGH-FRUCTOSE DIET ON CERTAIN CHARACTERISTICS OF METABOLISM IN THE SMALL INTESTINE OF THE RAT. (Fre.) Crouzoulon, G.

(Laboratoire de Physiologie Generale et Comparee, Universite Claude Bernard, Lyon 1, France). *Arch. Int. Physiol. Biochim.* 83(3):529-534; 1975.

4718 METABOLISM OF TISSUES OF THE INTESTINAL EPITHELIUM OF MICE AS A POSSIBLE INDICATION OF RADIATION DAMAGE TO THE ORGANISM. (Rus.) Puchkova, S. M.; Goloshchapova, Zh. A. (No affiliation given). *Radiobiologiia* 15(5):760-762; 1975.

4719 CHANGE IN ABSORPTION AND SECRETION FUNCTIONS OF SMALL INTESTINE UNDER THE INFLUENCE OF ROCKING. (Ukr.) Faitel'berg, R. O.; Udalov, Iu. F.; S'omik, L. I.; Gladkii, G. V. (Dept. Human and Animal Physiology, Odessa Univ., Odessa, USSR). *Fiziol. Zh.* 21(5):659-666; 1975.

See also, 4598, 4725, 4730.

GENERAL

4720 COLONIC BLOOD FLOW IN CAT AND MAN AS ANALYZED BY AN INERT GAS WASHOUT TECHNIQUE. (Eng.) Hulten, L.; Jodal, M.; Lindhagen, J.; Lundgren, O. (Dept. Surgery II, Univ. Goteborg, Goteborg, Sweden). *Gastroenterology* 70(1):36-44; 1976.

An inert gas elimination technique for studying blood flow and flow distribution in the colon was developed on the cat and applied to 55 patients during abdominal surgery. The method involves recording the elimination of intraarterially-injected ^{85}Kr from a colonic segment, whereby the γ- and β-radiation of the tracer is registered simultaneously by a scintillation detector and Geiger-Muller tube, resp. The total blood flow was determined from the recording of γ-radioactivity, and the muscularis blood flow was calculated from the mono-exponential elimination recorded by the Geiger-Muller tube. The relative weights of the muscularis and mucosa-submucosa were determined from dissections or histological sections. With these weights and total and muscularis blood flows, flow in the mucosa-submucosa was calculated. Total colonic blood flow in humans was 18 ml/min and 100 g of colonic tissue. In the muscularis layer, blood flow amounted to 11 ml/min and 100 g of muscularis tissue (n=12), and flow in the mucosa-submucosa was calculated to be 28 ml/min and 100 g of mucosal-submucosal tissue. About 66% of the total blood flow was distributed to the mucosa-submucosa. As the total colonic blood flow was enhanced, the increase in flow was diverted only to the mucosa-submucosa. In cats, the total blood flow, regional blood flow in the muscularis, and regional blood flow in the mucosa-submucosa were 22, 10, and 31 ml/min and 100 g of colonic tissue, resp. About 30% of the blood flow was distributed to the mucosa-submucosa. This demonstrates the great quantitative and qualitative circulatory similarities between the human and feline colons. The greater flow rates recorded in the mucosa is expected, because absorption and secretion, two energy-consuming processes, are located in this layer.

4721 THE EFFECT OF GATROINTESTINAL HORMONES ON THE GASTRIC MICROCIRCULATION. (Eng.) Guth, P. H.; Smith, E. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 71(3):435-438; 1976.

The effects of several gastrointestinal hormones on the gastric submucosal arterioles were evaluated in anesthetized cats using an *in vivo* microscopy technique. Alteration in diameter of submucosal arterioles, 40-90 μ in diameter, in response to infusion of different agents into the celiac axis, was measured. Pentagastrin [mean minimal effective dose by close intraarterial infusion (MED-i.a.)=0.02 μg/kg/min; dose for 50% maximum secretory effect by i.v. infusion (D_{50})=0.02 μg/kg/min], the octapeptide of cholecystokinin (OP-CCK; MED-i.a.=0.07 ng/kg/min; D_{50}=2.2 ng/kg/min), natural secretin (MED-i.a.=0.05 U/kg/min; D_{50}=0.02 U/kg/min), and histamine (MED-i.a.=0.04 μg/kg/min; D_{50}=1.5 μg/kg/min) produced arteriolar dilation. Only with histamine and OP-CCK did this occur, with doses that might be considered physiological. Synthetic secretin had no vasodilator activity, suggesting the presence of a contaminating agent in natural secretin. Glucagon had no effect on the submucosal arterioles. In addition, the effect of glucagon on the smaller (10-30 μ) terminal and subterminal submucosal arterioles was studied in the rat by *in vivo* microscopy. Again, no effect was observed with glucagon, but norepinephrine (0.04-0.18 μg/kg topically; 2.4-6.2 μg/kg/min, i.a.) produced vasoconstriction. The latter findings provide strong evidence against a direct effect of glucagon on the gastric microcirculation.

4722 DISTRIBUTION AND ARTERIOVENOUS SHUNTING OF GASTRIC BLOOD FLOW IN THE BABOON: EFFECT OF EPINEPHRINE AND VASOPRESSIN INFUSIONS. (Eng.) Zinner, M. J.; Kerr, J. C.; Reynolds, D. G. (Walter Reed Army Inst. Res., Washington, DC). *Gastroenterology* 71(2):299-302; 1976.

To study the mechanism involved in the control of upper gastrointestinal bleeding by vasoconstricting agents, the effects of 60-min infusions of vasopressin (0.005 U/kg/min) and epinephrine (0.05 μ/kg/min) on gastric hemodyanimcs were determined in seven anesthetized baboons. The total gastric blood flow was measured electromagnetically, and radioactive microspheres (15 ± 5 μ) with three

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labels were used to determine the regional distribution of gastric blood flow and arteriovenous shunting. The control flow was 55 ± 8 ml/min; 77.4 ± 2.7% of the flow went to the gastric mucosa, and 1.7 ± 0.4% of injected spheres appeared in the liver. Epinephrine infusion resulted in a sustained vasoconstriction to 18 ± 5 ml/min with no autoregulatory escape and no changes in arterial pressure or cardiac output. Vasopressin resulted in a decrease in flow to 14 ± 3 ml/min with no escape. Although cardiac output did not change, there was a significant hypertensive effect during the vasopressin infusion. Neither redistribution of flow nor change in arteriovenous shunting was noted with either epinephrine or vasopressin. The transmucosal electrical potential difference was 62 ± 8 mV, which did not change significantly with either infusion. It appears that the control of bleeding effected by epinephrine and vasopressin is not related to arteriovenous anastomosis, but is purely a function of vasoconstriction.

4723 EFFECT OF FEEDING ON CATABOLISM AND ACTIVITY OF EXOGENOUS GASTRIN IN DOGS.

(Eng.) Woussen-Colle, M. C.; Limbosch, J. M.; Keuppens, F.; de Graef, J. (Dept. Surgery, Free Univ. Brussels, Belgium). *Acta Hepatogastroenterol.* 23(3):216-221; 1976.

The effect of a meal upon the catabolism and activity of exogenous gastrin was tested in four antrectomized and four nonantrectomized dogs with Heidenhain pouches. The meal decreased the serum gastrin level in both the antrectomized and nonantrectomized dogs infused with porcine gastrin (4 μg/kg/hr, i.v.) or human gastrin I (3 μg/kg/hr, i.v.), resp. This decrease amounted to 17 and 15% in the nonantrectomized and antrectomized dogs, resp., 60 min after feeding, and the gastrinemia then returned gradually to control levels. In nonantrectomized dogs, the infusion of a near maximal dose of gastrin increased the acid response to the meal to a level above the maximal histamine-induced (0.08 mg/kg/hr, i.v.) acid output. Exogenous gastrin also increased the acid response to a meal in antrectomized dogs. These data indicate that feeding increases the metabolic clearance rate of exogenous gastrin, which could be related to changes in the intestinal blood flow, and that after feeding, one or more hormones capable of stimulating the acid secretion, but unrelated to gastrin, are probably released. These hormones could be of major importance in the response of denervated pouches to feeding.

4724 PASSIVE ORAL IMMUNIZATION WITH BOVINE IMMUNOGLOBULINS: ENTEROPATHOGENIC Escherichia coli FROM INFANTS AND BOVINE ANTI-E. coli LACTOSERUM ASSAYED IN THE RABBIT ILEAL LOOP MODEL.

(Eng.) Zinkernagel, R. M.; Colombini, A. (Institut de Biochimie, Universite de Lausanne, 21, rue du Bugnon, CH-1011 Lausanne, Switzerland). *Med. Microbiol. Immunol. (Berl.)* 162(1):1-7; 1975.

To evaluate the possible therapeutic or prophylactic effectiveness of immune bovine lactoserum (BLS) antipolyvalent enteropathogenic *Escherichia coli*, its effect on bacterial growth, viability, and bacteria-induced fluid accumulation was examined in rabbit ileal loops. Human enteropathogenic *E. coli* strains 0125:K70 (B15), 0111:K58 (B4), and 055:K59 (B5) (1-3 x 10^9/inoculum) induced the secretion of 4-6 ml of fluid per 10-cm loop. This effect was inhibited effectively by BLS [corresponding to 50 mg immunoglobulin G (IgG)/loop], while the viability of bacteria counts decreased 2- to 25-fold compared with bovine serum albumin. *E. coli* 026:K60 (B6), 0126:K71 (B16), and 0127:K63 (B8) caused moderate secretion (2-3 ml/10-cm loop) that was significantly neutralized by BLS. *E. coli* 086:K61 (B7) and 0128:K67 (B12) did not give positive loops. The fluid secretion was dose-dependent for *E. coli* 0125:K70 (B15) over the range 2.5 x 10^9-8 x 10^9 bacteria/loop. The titration of the effect of BLS on fluid secretion caused by the same strain revealed a dose-dependent decrease. The best inhibition was obtained with 100 mg BLS/loop, the highest dose tested. Anti-*E. coli* antibodies may be a major requirement for protection against *E. coli*-induced intestinal fluid accumulation.

4725 GASTRIC INHIBITORY POLYPEPTIDE (GIP): INTESTINAL DISTRIBUTION AND STIMULATION BY AMINO ACIDS AND MEDIUM-CHAIN TRIGLYCERIDES.

(Eng.) O'Dorisio, T. M.; Cataland, S.; Stevenson, M.; Mazzaferri, E. L.; (Dept. Medicine, Ohio State Univ., Columbus, OH 43210). *Am. J. Dig. Dis.* 21(9):761-765; 1976.

Radioimmunoassayable gastric inhibitory polypeptide (GIP) was measured in extracts of canine antrum, duodenum, jejunum, and ileum, and observations regarding the nutrients that stimulate the release of GIP were extended. The highest GIP concentrations were found in the duodenum (347 ± 53 ng/g) and jejunum (300 ± 68 ng/g). An immunochemical similarity was demonstrable between porcine GIP and canine GIP. Dogs prepared with Mann-Bollman fistulae were given an amino acid (AA) mixture or medium-chain triglycerides (MCT, containing 75.0, 23.0, 1.0, and 1.0% caprylic, octanoic, capric, decanoic, caproic, and lauric acids, resp.) by intraduodenal perfusion. With AA, a peak mean serum concentration of 672 ± 106 pg/ml was reached 15 min after the perfusion began. MCT resulted in a peak mean serum GIP concentration of 504 ± 55 pg/ml 30 min after beginning of the perfusion. When compared to previously reported results, AA and MCT are not as potent as corn oil (long-chain triglyceride) or glucose in stimulating GIP release. It is concluded that immunoassayable GIP concentrations are highest in the canine proximal small intestine, and that AA and MCT are weak stimulants of GIP release in the dog.

4726 CELLULAR KINETICS OF THE INTESTINAL IMMUNE RESPONSE TO CHOLERA TOXOID IN RATS.

(Eng.) Pierce, N. F.; Gowans, J. L. (Baltimore City Hosps., 4940 Eastern Ave., Baltimore, MD 21224). *J. Exp. Med.* 142(6):1550-1563; 1975.

A regimen of immunization with cholera toxoid in PVG/c rats was sought, which would establish a high density of antitoxin-containing cells (ACC) in the lamina propria, and the origin of the ACC was determined. A single i.p. administration of purified toxoid (100 μg) or of crude toxoid (100 antitoxin combining U/ml, p.o.) produced few ACC. The best cellular response was achieved by a single i.p. dose of toxoid in Freund's complete adjuvant, followed by an intraintestinal boost 2 weeks later. ACC appeared in the thoracic duct lymph 2 days after boosting, reaching a peak of about 200,000 ACC/hr at 3-4 days. This was followed by the appearance of large numbers of ACC in the intestine. The i.p. dose of toxoid by itself gave rise to very few ACC in the gut or thoracic duct lymph, but it had clearly primed the gut immune system for a secondary response. Priming was also achieved by the prolonged p.o. intake of toxoid. The importance of the intestinal route for boosting was shown by the failure of i.p. challenge to give an ACC response in the intestine after i.p. priming and by the small response it provoked after p.o. priming. ACC contained predominantly immunoglobulin A in thoracic duct lymphocytes (TDL) and in the lamina propria. Two observations indicated that the major source of the lamina propria ACC was from cells that emerged in the thoracic duct lymph after intraintestinal challenge. The establishment of a thoracic duct fistula immediately before challenge prevented the appearance of ACC in the intestine, and many ACC appeared in the intestine of normal rats after the injection of TDL rich in ACC. Although homing of ACC precursors to the gut was not antigen-dependent, the distribution of ACC in the lamina propria was considerably influenced by the site of the intestinal challenge, the density of ACC being greatest at or distal to the site of injection of toxoid into the lumen of the gut.

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4727 A COLON TUMOR MODEL FOR ANTICANCER AGENT EVALUATION. (Eng.) Griswold, D. P.; Corbett, T. H. (2000 Ninth Ave. South, Birmingham, AL 35205). *Cancer* 36(6):2441-2444; 1975.

The development of colon tumors that could be used as models to test the usefulness of drugs in human colon cancers was attempted in mice. The tumors were induced with 1,2-dimethylhydrazine-di-HCl (DMH; 0.2 mg/mouse/week, s.c., for 7 months), N-methyl-N-nitrosourea (MNU; 0.07 mg/mouse per rectum, biweekly for 6 months), N-methyl-N'-nitro-N-nitrosoguanidine (MNNG; 0.04 mg/mouse per rectum, 4 times weekly for 8 months), and N-nitroso-N-methylurethane (NMU; 0.03 mg/mouse per rectum, biweekly for 6 months). Groups of C57BL/6, DBA/2, and C3H mice were tested with all four compounds. Balb/c mice were tested with all agents except MNU, and Swiss mice were used for DMH slides only. Temporary cessation of exposure was based on clinical signs, including body weight. MNU and NMV produced over 50% mortality by the 120th day of exposure. A total of 82 colon tumors were considered suitable for transplantation (from 1,011 mice orginally started). Of the 82 tumors transplanted, 4 were successful. Of these four, there was one type II tumor and two type III tumors produced by DMH. NMU produced a type IV (undifferentiated) colon tumor. The response of these transplants to chemotherapeutic agents used in man was tested. From these preliminary results, the authors suggest that the response of mice to chemotherapeutic agents sufficiently parallels that of human colon tumors to be useful as a predictive model for the selection of new and useful chemotherapeutic agents.

4728 ADVERSE EFFECTS OF JEJUNOILEAL BYBASS ON GROWTH AND DEVELOPMENT. (Eng.) Grosfeld, J. L.; Cooney, D. R.; Csicsko, J. F.; Madura, J. A. (James Whitcomb Riley Hosp. Children, 1100 W. Michigan St., Indianapolis, IN 46202). *Surgery* 80(2):201-207; 1976.

The effect of 90% jejunoileal bypass on growth and development was studied in 20 growing (100 g) male Sprague-Dawley (SD) rats and 15 male, genetically obese, growing (125 g) Zucker fat rats (FR). Twenty unoperated SD rats and 15 FR of similar age and weight served as controls. Animals were evaluated for weight gain or loss, complications, and survival. When the animals were sacrificed after 4 months caliper measurements of long bones, vertebral column, pelvis, and skull were obtained, and brain, liver, spleen, and kidneys were excised and weighed. Liver and gonadal histology were also obtained. The FR had a 20% anastomotic leak rate and a 33% mortality rate. The mortality rate was 5% in the SD rats and zero in controls. There were no anastomotic leaks in SD rats. Bypassed animals showed growth retardation; the mean weight gain of bypassed SD rats was 32% ($p<0.05$) and of FR was 19% of controls ($p<0.05$). Organ weights were similar, except for a smaller brain in bypassed rats [SD=1.05 ± 0.08 g, compared with 1.83 ± 0.08 g in controls ($p<0.05$); FR=1.2 ± 0.12 g, compared with 1.68 ± 0.09 g in controls ($p<0.025$)]. Skeletal development was significantly retarded in bypassed rats [vertebral column=125.9 ± 3.5 mm, compared with 138.3 ± 3.9 mm in controls ($p<0.025$); ileum=39.4 ± 1.1 mm, compared with 46.2 ± 1.5 mm in controls ($p<0.05$); skull circumference=20.2 ± 0.03 mm, compared with 22.5 ± 0.05 mm in controls ($p<0.025$)]. No increase in fatty infiltration of the liver was observed. Spermatogenesis was diminished by 30% ($p<0.05$) in bypassed SD rats. The data document significant morbidity and mortality rates, growth retardation, and diminished spermatogenesis in bypassed adolescent rats. These results imply that jejunoileal bypass may adversely affect intellectual, skeletal, and reproductive development, and the advisability of this procedure in growing subjects is questioned.

4729 A POSSIBLE EXPLANATION FOR POSTOPERATIVE DIARRHEA AFTER COLOSTOMY CLOSURE. (Eng.) Tilson, M. D.; Fellner, B. J.; Wright, H. K. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Am. J. Surg.* 131(1):94-97; 1976.

The hypothesis that the absorptive capacity of the unused distal colon decreases during the period of bypass, explaining the development of postoperative diarrhea after a closure, was tested by comparing the absorptive capacity of the colons of normal female Sprague-Dawley rats with that of the colons of rats with temporary bypass. Net fluxes of water and sodium were determined in normal animals and in animals that had undergone cecoproctostomy; the fluxes were determined by an *in vivo* perfusion method in which perfusate solutions containing either 20 mM glucose or 20 mM mannitol were used. Transit studies were carried out with a perfusate solution containing 5% mannitol; after equilibration to a steady state, a bolus of phenol red was introduced into the perfusate, effluent samples were collected, and phenol red was analyzed by spectrophotometry. The net water flux for the normal colon was 504 μl/hr during perfusion with the mannitol-containing solution; water absorption increased to 120 μl/hr with glucose. In the bypassed colon, the net water flux was 324 μl/hr with mannitol and only 300 μl/hr with glucose. In colons in which the rate of absorption with mannitol perfusate was determined 3-9 days after restoration of function, the rate returned to normal (631 μl/hr), but the rate with glucose perfusate remained low (192 μl/hr). In the normal colon, the rate of net sodium absorption with mannitol perfusate was 57.9 μEq/hr, and the rate was 113.2 μEq/hr with the glucose perfusate. The rate of sodium absorption in the experimental colon was 39.8 μEq/hr with mannitol; with glucose, the experimental colon began to secrete sodium, with a net flux of -47.6 μEq/hr. The dye-dilution curves for normal and experimental animals were superimposable, the calculated mean transit times being 20.78 min for normal colons and 16.85 min for experimental colons. The results suggest that the diminished absorptive capacity of the defunctionalized colon may be an etiologic factor in the pathogenesis of diarrhea after the closure of colostomies in some patients.

4730 SULFATED BILE ACIDS IN GERM-FREE AND CONVENTIONAL MICE. (Eng.) Eyssen, H. J.; Parmentier, G. G.; Mertens, J. A. (Rega Institute Medical Res., Univ. Leuven, Minderbroederstraat 10, B-3000 Leuven, Belgium). *Eur. J. Biochem.* 66(3): 507-514; 1976.

Since the bile acids of the mouse have been less well investigated than those of other laboratory animals, sulfated and nonsulfated bile acids were determined in the intestines and in the feces of 7-month-old germ-free and conventional C3H male mice. The bile acid pools in the gallbladder and small intestine were 21.13 mg/100 g-body weight in germ-free mice and 11.50 mg in conventional mice. The bile acid pools in the cecum and large intestine of germ-free mice were 3.03 mg/100 g, compared to 1.24 mg in conventional mice. Fecal bile acid excretion was 2.93 mg and 4.12 mg/100 g in 24 hr germ-free and conventional mice, resp. The major bile acids from germ-free mice were cholic acid, α-muricholic acid, and β-muricholic acid. Small amounts of chenodeoxycholic and allocholic acid were also present. In addition to these primary bile acids, the secondary bile acids lithocholic, deoxycholic, and ω-muricholic acid, were identified in conventional mice. In both germ-free and conventional animals, significant amounts of chenodeoxycholic and cholic acid were present as the 7-monosulfate esters. The sulfate esters of these bile acids did not exceed 2% of the total bile acids in the small intestine, but accounted for approximately 50% of the bile acids in the cecum and the large intestine. In contrast, the muricholic acids were nearly exclusively found in the non-sulfate fraction. Alkaline hydrolysis without prior solvolysis of the sulfate esters resulted in loss of bile acids and production of artifacts. The bile acids of the mouse cannot be analyzed by methods involving alkaline deconjugation, unless a solvolysis step is included in the procedure.

4731 SIMILAR SENSITIVITIES OF PANCREATIC AND BILIARY SECRETION TO CHOLECYSTOKININ PLUS SECRETIN INFUSION. (Eng.) MacGregor, I. L.; Knill, J. R.; Meyer, J. H. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *Am. J. Dig. Dis.* 21(8):641-644; 1976.

The sensitivities of the gallbladder and pancreas to graded increases of cholecystokinin (CCK) with a constant secretin background were investigated in 20 healthy men. The mean basal trypsin concentration during the i.v. infusion of saline in aspirates from the duodenum was 26.95 U/ml. With increasing volume flow stimulated by the addition of secretin (0.25 CU/kg/hr) and the lowest dose of CCK (0.062 IDU/kg/hr) to the infusion, the trypsin and bile salt concentrations decreased. Continued graded increases of CCK (0.125, 0.250, 0.5, and 1.0 IDU/kg/hr) were associated with a simultaneous increase in trypsin and bile salt concentrations and outputs, their dose-response curves being almost superimposable. At the highest dose of CCK, the mean trypsin output was 9.288 KU/30 min. Increasing the CCK dosage from 0.062 U/kg/hr to 0.25 U/kg/hr caused an increase in bile salt output from 65.99 μmol/30 min to 589.79 μmol/30 min ($p<0.001$), which coincided with an increase in trypsin output from 1.533 KU/30 min to 4.501 KU/30 min. Under conditions more closely approaching normal postcibal events, the previously described differing sensitivities of the pancreas and gallbladder apparently do not occur.

4732 ELECTRON MICROSCOPIC STUDY OF INTERACTION OF Salmonella WITH THE EPITHELIUM OF THE ILEUM IN RATS. (Rus.) Zufarov, K. A.; Baibekov, I. M.; Foliyants, A. V.; Mukhamedov, M. (Tashkent Medical Inst., Tashkent, USSR). *Arkh. Patol.* 37(9): 42-48; 1975.

4733 INFLUENCE OF SEPHADEX ON THE STATE OF THE INTESTINE OF IRRADIATED RATS. (Rus.) Fedorovsky, L. L. (No affiliation given). *Radiobiologiia* 15(5):786-788; 1975.

4734 COURSE OF GASTRIC SECRETION, SERUM GASTRIN AND SERUM GASTRIN INHIBITORY PROTEIN LEVELS FOLLOWING SUBTOTAL BYPASS OR RESECTION OF THE

SMALL INTESTINE IN THE DOG [Abstract]. (Ger.) Becker, H. D.; Borger, H. W.; Schafmayer, A. (No affiliation given). *Z. Gastroenterol.* 14:229: 1976.

4735 CHANGES OF ARTERIAL BLOOD PRESSURE AND PULSATION OF INTESTINAL NERVES AFTER THE ACTION OF LACTIC ACID ON THE SMALL INTESTINE INTERCEPTORS. (Rus.) Lebedeva, V. A. (Pavlov's Inst. Physiology, Acad. Sci. USSR, Leningrad, USSR). *Fiziol. Zh. SSSR* 61(11):1686-1696; 1975.

4736 ELECTRICAL STRUCTURE OF THE NORMAL HEPATIC TISSUE. (Rus.) Sharovskaya, Y. Y.; Mittelman, L. A.; Smolyaninov, V. V. (Lab. Mathematical Methods Biology, Moscow State Univ., Moscow, USSR). *Tsitologiia* 17(12):1376-1382; 1975.

4737 STUDY OF SOME ASPECTS OF HEPATIC HEMODYNAMICS. (Spa.) Ortiz Feijoo, J.; Salgado Escobar, J. L.; Gonzalez Posada, J. C.; Rangel Abundis, A. (Servicio de Medicina Interna, Hospital General, Centro Medico La Raza, I.M.S.S., Mexico). *Prensa Med. Mex.* 40(5/6):160-167; 1975.

4738 PERFUSION OF ISOLATED PIG LIVER: METHOD AND RESULTS. (Ita.) Biliotti, G.; Masi, C.; Perna, A. M.; Carra, F.; Origone, A.; Marsili, M.; Lorenzi, P.; Lombardi, A.; Pernice, L. M.; Mazzanti, R.; Ciampi, L.; La Cava, G.; Pieri, A. (Istituto di Clinica Chirurgica Generale e Terapia Chirurgica, Universita de Firenze, Florence, Italy). *Osp. Ital. Chir.* 28(1):21-34; 1975.

4739 INVESTIGATIONS OF THE AUTOLYSIS OF LIVER TISSUE BY PASSIVE ELECTRICAL AND THERMODYNAMIC STATISTICAL METHODS. (Ger.) Fritzsch, G.; Pliquett, F. (Institut fur Biophysik, 7022 Leipzig, Edgar-Andre-Strasse 3, E. Germany). *Acta Histochem. (Jena)* 52:134-144; 1975.

4740 FUNCTION TEST OF THE HEPATIC RETICULOENDOTHELIAL SYSTEM IN HEMORRHAGIC SHOCK IN DOGS [Abstract]. (Ger.) Doge, H.; Hennig, K.; Sinz, V.; Haumann, J.; Lauschke, G. (Nuklearmedizinische Abteilung, Medizinische Akademie Dresden, Dresden, E. Germany). *Radiol. Diagn. (Berl.)* 17(1):138-139; 1976.

4741 CONSERVATION OF RAT LIVER BY PROLONGED PERFUSION WITH A COMPLEX SOLUTION LACKING HEMOGLOBIN. (Rum.) Toader, C.; Duca, S.; Suciu, A.; Lezeu, R.; Duca, C.; Schwartz, M.; Cioroiu, M.; Berindeanu, E. (Clinica a III-a chirurgie, Cluj-Napoca, Rumania). *Chirurgia (Bucur.)* 25(1):19-26; 1976.

4742 TRANSPLANTATION OF THE LIVER AS A THERAPEUTIC METHOD IN EXPERIMENTAL INTOXICATION WITH Amanita phalloides IN GUINEA PIGS. (Cze.) Koristek, V.; Cerny, J.; Hokl, J.; Filkuka, J.; Gregor, Z.; Peresty, S.; Busch, K.; Bohm, F.; Stepanek, V.; Vrastyak, J.; Cikl, M.; Kulhanek, V.; Palyza, V.; Dvorak, R. (II. chirurgicka klinika lekarske fakulty UJEP, Brno, Pekarska 53, Czechoslovakia). *Rozhl. Chir.* 54(6):381-386; 1975.

4743 ORTHOTOPIC ALLOTRANSPLANTATION OF THE LIVER IN PIGS. (Cze.) Koristek, V.; Cerny, J. Filkuka, J. Hokl, J.; Peresty, S.; Dvorak, R.; Macek, M.; Ciki, M.; Gregor, Z.; Busch, K.; Vrastyak, J. (II. chirurgicka klinika lekarske fakulty UJEP, Brno, Pekarska 53, Czechoslovakia). *Rozhl. Chir.* 54(8):575-586; 1975.

4744 LYMPHOLOGICAL ASPECTS OF LIVER TRANSPLANTATIONS IN DOGS. (Cze.) Vosmik, J.; Bartos, V.; Vucinic, M.; Ondracek, Z.; Cermak, S.; Pavlik, S.; Kocinova, M.; Malek, P. (140 00 Praha 4-Krc, Budejovicka 800, Czechoslovakia). *Rozhl. Chir.* 54(8):569-574; 1975.

4745 PATHOMORPHOLOGY OF PHARMACOLOGICALLY INFLUENCED LANTHANIDE-INDUCE LIVER DYSTROPHY [Abstract]. (Ger.) Gross, U.; Werneke, M.; Beckenbach, H.; Oberdisse, E. (Institut fur Pathologie im Klinikum Steglitz, Freie Universitat Berlin, Berlin, W. Germany). *Verh. Dtsch. Ges. Pathol.* 58:521; 1975.

4746 CHANGES IN THE ACTIVITY OF MICROSOMAL 4ene-5α-STEROID REDUCTASE IN THE RAT LIVER DUE TO ALCOHOL [Abstract]. (Ger.) Bode, Chr.; Fischer, H.; Bode, J. Ch. (No affiliation given). *Z. Gastroenterol.* 14:233-234; 1976.

4747 AUTOPHAGOCYTOSIS INHIBITION BY CYCLOHEXIMIDE IN RAT HEPATOCYTES DAMAGED BY D-GALACTOSAMINE [Abstract]. (Ger.) Rumpelt, H. J.; Albring, M. (Institut fur Cytologie unde Cytopathologie der Universitat Marburg/Lahn, Marburg, W. Germany). *Verh. Dtsch. Ges. Pathol.* 58:522; 1974.

4748 PHARMACOLOGICAL INVESTIGATIONS ON THE POSSIBLE INFLUENCES ON LANTHANIDE-INDUCED LIVER DYSTROPHY [Abstract]. (Ger.) Oberdisse, E.; Werneke, M.; Gross, U. (Pharmakologisches Institut der Freien Universitat, Berlin, W. Germany). *Verh. Dtsch. Ges. Pathol.* 58:520; 1974.

4749 EXPERIMENTAL THIOACETAMIDE POISONING OF THE CAT AS A MODEL OF HEPATOLYSIS [Abstract]. (Ger.) Munzenmaier, R.; Fischer, B.; Loewe, K. R. (Pathologisches Institut des Klinikums Mannheim, Mannheim, W. Germany). *Verh. Dtsch. Ges. Pathol.* 59:453; 1975.

4750 THE EFFECT OF LIPIDS OF TYPHOID ENDOTOXIN ON THE ACTIVITY OF SOME ENZYMES IN LIVER TISSUE. (Rus.) Muzhichenko, A. V. (Chair Bio-

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chemistry, Medical Sch., Volgograd, USSR). *Vopr. Med. Khim.* 21(5):494-497; 1975.

4751 ELECTRONIC ABSORPTION AND ELECTRON SPIN RESONANCE STUDIES ON THE INTERACTION BETWEEN THE BIOLOGICALLY RELEVANT COPPER(11) GLYCYLGLYCINE AND L-HISTIDINE COMPLEXES WITH D-PENICILLAMINE. (Eng.) Laurie, S. H.; Lund, T.; Raynor, J. B. (Sch. Chemistry, Leicester Polytechnic, P.O. Box No. 143, Leicester, England). *J. Chem. Soc.* 14:1389-1394; 1975.

4752 IMPORTANCE OF DRAINAGE OF THE THORACIC DUCT DURING PERFUSION OF THE DOG PANCREAS IN SITU. (Cze.) Bartos, V.; Nozickova, M.; Pavlova, L. (146 22 Praha 4-Krc, Budejovicka 800, Czechoslovakia). *Rozhl. Chir.* 54(8):587-590; 1975.

4753 EXPERIMENTAL ULCER. (Ger.) Varro, V. (I. Med. Univ.-Klinik, H-6701 Szeged, Postfach 469, Hungary). *Z. Gesamte Inn. Med.* 30(19):624-628; 1975.

4754 PREVENTION OF STRESS ULCER BY CALCITONIN (THYROCALCITONIN) IN RATS AND IN PIGS [Abstract]. (Fre.) Barlet, J. P. (Station de Physiopathologie de la Nutrition, I.N.R.A., Theix, 63110 Beaumont, France). *J. Physiol. (Paris)* 71(2):262A-263A; 1975.

4755 CREATION OF DENERVATED ANTRAL AND FUNDIC POUCHES IN DOGS. TECHNICAL CONSIDERATIONS CONCERNING THE SURGICAL TIMETABLE AND THE POSTOPERATIVE CONSEQUENCES. (Fre.) Labrid, C.; Dureng, G.; Basiez, M.; Bert, H.; Boero, Ch. (Laboratoire de Pharmacodynamie, C.E.R.M., Route de Marsat, 63201 Riom, France). *C.R. Soc. Biol. (Paris)* 169(3):599-605; 1975.

4756 CATECHOLAMINE LEVEL IN THE HYPOTHALAMUS AND IN DIFFERENT PARTS OF THE STOMACH IN EXPERIMENTAL GASTRIC ULCER AND CHANGE IN THE CATECHOLAMINE LEVEL UNDER THE INFLUENCE OF GANGLERONE. (Rus.) Mirzoian, S. A.; Virabian, T. L. (Erevan Medical Inst., Erevan, USSR). *Zh. Eksp. Klin. Med.* 15(6):3-8; 1975.

4757 SERUM PEPSINOGEN CONCENTRATIONS IN GASTRECTOMIZED RATS [Abstract]. (Ger.) Foth, B. (Pathologisches Institut, Freie Universitat Berlin, Klinikum Charlottenburg, Berlin, W. Germany). *Verh. Dtsch. Ges. Pathol.* 59:564; 1975.

See also, 4590, 4658, 4866, 4947, 5007.

DIAGNOSTIC PROCEDURES

4758 USE OF SUBSTRATE-COATED BARIUM SULFATE TABLETS IN THE EVALUATION OF DIGESTIVE ENZYME DEFICIENCY. (Eng.) Kalifa, L. G.; Koehler, R. E.; Margulis, A. R.; Goldberg, H. I.; Stoughton, J. A.; Gibson, R. D. (Sch. Medicine, Univ. California, San Francisco, CA 94143). *Radiology* 120(2):303-306; 1976.

In an attempt to adapt the use of substrate-coated radiopaque tablets to the analysis of digestive enzyme activity, the properties of tablets coated with one of three substrates were studied *in vitro* and *in vivo* in six dogs and in 16 normal humans. Tablets coated with glyceryl tripalmitate, food starch, or an isolated soy protein (promine) remained intact for the full 6-hr observation period when immersed in water, 0.1 N HCl, and simulated gastric juice (2.0 g NaCl, 3.2 g pepsin, 7 ml concentrated HCl, H_2O to make 1,000 ml; pH=1.2). Fragmentation of tablets of each type occurred in 3 hr or less in simulated duodenal juice (650 ml H_2O, 6.18 g KH_2PO_4, 190 ml 0.2 N NaOH, 10 g pancreatin; pH adjusted to 7.5 with 0.2 N NaOH). The tablets all had an enteric coating, but the absence of this coating made no detectable difference in the time required for fragmentation of protein- or starch-coated tablets in the simulated duodenal juice. The addition of dog food to the duodenal juice eliminated tablet fragmentation of all three substrate types. In three dogs that were fasted for 12-18 hr, all tablets remained intact in the small bowel for an average of 2-2.5 hr. Starch- and promine-coated tablets given 30 min after a meal behaved similarly to those given after fasting; the time of the breakdown of tripalmitin-coated tablets was delayed an average of 4.5 hr. The time of onset of fragmentation of the tripalmitin-coated tablets was decreased by the i.v. administration of 3 Ivy U/kg of cholecystokinin (CCK) 5 min before their administration. The diversion of pancreatic secretions from the bowel considerably prolonged the onset of disintegration of the tablet core for all three types of substrate. Catheterization of the pancreatic duct abolished the CCK-induced increase in the rate of breakdown. In the human subjects, all three types of substrate left the stomach by 2 hr, and were fragmented 3 hr later. These results suggest that these tablets may be used in the diagnosis of pancreatic exocrine insufficiency.

4759 USE OF HYPERTONIC-BARIUM MIXTURES IN THE DIAGNOSIS OF THE DUMPING SYNDROME. (Eng.) Seymour, E. Q. (Medical Univ. South Carolina, 80 Barrett St., Charleston, SC 29401). *Am. Surg.* 42(8): 547-553; 1976.

The value of using a hypertonic glucose-barium mixture in the differential diagnosis of the true dumping syndrome and the dumping-like response resulting from an anxiety reaction is described. The patient is given 8-10 ounces of the test meal, which contains 6.25 g glucose/ounce of the meal, averaging about 50-62 g of glucose. In the true dumping syndrome, the bowel wall is edematous and distended with excessive fluid. As the sequence continues, there is considerable flocculation of the barium. Radiographs taken in one patient illustrate this pattern; the extent of the outpouring of fluid was so great that the patient became hypotensive, and i.v. fluids were necessary. Radiographs taken in another patient illustrate that the appearance of the bowel in a negative glucose test for dumping syndrome is similar to that in a standard barium meal test. The author concludes that the hypertonic glucose-barium meal is useful in the diagnosis of the true physiologic dumping syndrome.

4760 COMBINED LACTOSE-d-XYLOSE TOLERANCE TEST IN INFANCY. (Eng.) Chandrasekaran, R.; Kumar, V.; Moorthy, B. (Postgraduate Inst. Medical Education Res., Chandigarh, India). *Digestion* 14 (3):281-284; 1976.

A test in which the lactose tolerance and *D*-xylose tolerance tests are combined was performed in 10 normal infants, and the results were compared to those obtained when each of the tests was performed separately in the same infants. *D*-xylose (1 g/kg, maximum 13 g) and lactose (3.5 g/kg for infants below 1 yr; 2 g/kg in those over 1 yr) were administered alone or in combination by nasogastric tube following a 5-hr fast. Blood samples were collected at 0, 30, 60, 90, and 120 min. The mean peak rise of glucose following the combined test was 47.1 ± 16.4 mg%, and the rise was 46.7 ± 13.0 mg% following the lactose load. Similarly, the mean peak values for *D*-xylose were 45.0 ± 10.4 mg% and 39.9 ± 6.9 mg% for the combined and separate tests, resp. The results suggest that the combined test is as effective as two separate tolerance tests in the evaluation of dissacharide intolerance, and it is much more convenient.

4761 THE EFFECT OF SODIUM TAUROCHOLATE ON BILIAR IODIPAMIDE EXCRETION IN THE DOG. (Eng.) Burgener, F. A.; Fischer, H. W. (Univ. Rochester Sch. Medicine Dentistry, Rochester, NY). *Gastroenterology* 71(3):475-478; 1976.

The effect of sodium taurocholate in stepwise increas ing infusion rates (0.3-9.6 µmol/min/kg) on the biliary excretion rate and concentration of iodipamide, both of which affect the degree of radiographic opacification of the biliary tree during cholangiography, was investigated in six dogs (10 experiments). The bile was completely diverted, and the experiments were performed while the animals were under general anesthesia. Iodipamide was administere i.v. with an initial priming dose of 33 µmol/kg, followed by a constant infusion of 1.3 µmol/min/kg. Although the bile flow continuously increased with an increasing taurocholate dose, the iodipamide excretion rate reached a plateau with a 0.6 µmol/min/kg of taurocholate infusion, which was 20% higher tha with the lowest taurocholate dose. With a taurocholate dose over 2.4 µmol/min/kg, a significant decrease in the iodipamide rate was found, amounting to 22% of its maximum value with the largest taurocholate dose. The bile iodipamide concentration was at its maximum with the lowest taurocholate dose, and it decreased with an increasing taurocholate dose.

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Since the bile iodipamide concentration is probably the most important determinant in clinical cholangiography, low bile salt plasma levels should result in the best radiographic visualization of the biliary tree.

4762 A RANDOMIZED TRIAL OF PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY WITH THE CHIBA NEEDLE VERSUS ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY FOR BILE DUCT VISUALIZATION IN JAUNDICE. (Eng.) Elias, E.; Hamlyn, A. N.; Jain, S.; Long, R. G.; Summerfield, J. A.; Dick, R.; Sherlock, S. (Royal Free Hosp., Pond St., London, NW3 2QG, England). *Gastroenterology* 71(3):439-443; 1976.

Sixty consecutive patients who were deeply jaundiced or in whom i.v. cholangiography had failed were randomized to retrograde endoscopic cholangiography or percutaneous transhepatic cholangiography with the skinny Chiba needle technique. The efficacy in demonstrating the bile ducts, the overall diagnostic yields, and the morbidity rates of the two procedures were compared. Twenty-eight patients were assigned to retrograde cholangiography, which succeeded in 17. Percutaneous cholangiography was successful in 16 of the remaining 32 patients. When patients in whom one procedure was unsuccessful were reinvestigated by the other technique, retrograde cholangiograms were obtained in 13 of 16, and percutaneous cholangiograms in 8 of 11. Thus, one or the other technique was successful in 54 of 60 patients. Percutaneous cholangiography was successful in 19 of 29 patients with extrahepatic cholestasis but in only 6 of 31 patients with intrahepatic cholestasis. Endoscopic retrograde cholangiography succeeded in 13 patients with extrahepatic and 19 with intrahepatic cholestasis. Complications occurred only in patients with extrahepatic cholestasis; cholangitis and septicemia occurred in one patient after retrograde cholangiography and in two after the percutaneous technique. An intraperitoneal bile leak occurred in one other patient after percutaneous cholangiography. Percutaneous cholangiography with the narrow needle is a simple, inexpensive, and reliable method for demonstrating the biliary system, and is usually successful when an extrahepatic cause of cholestasis is present. The occurrence of serious complications in patients with extrahepatic cholestasis, despite prophylactic antibiotics, makes early surgery mandatory after both techniques.

4763 TECHNETIUM-99m-PYRIDOXYLIDENEGLUTAMATE, A NEW AGENT FOR GALLBLADDER IMAGING: COMPARISON WITH ^{131}I-ROSE BENGAL. (Eng.) Kubota, H.; Eckelman, W. C.; Poulose, K. P.; Reba, R. C. (Washington Hosp. Center, Washington, DC). *J. Nucl. Med.* 17(1):36-39; 1976.

The distribution of ^{99m}Tc-pyridoxylideneglutamate (^{99m}Tc-PG) was compared with that of ^{131}I-rose bengal to determine whether ^{99m}Tc-PG can be used in human hepatobiliary studies. Approximately 9 μCi in 0.086 ml of the ^{99m}Tc compound and 0.9 μCi in 0.052 ml of the ^{131}I-rose bengal were mixed and injected in New Zealand rabbits; aliquots of various tissues were counted for ^{131}I and ^{99m}Tc by dual nuclide spectral analysis. Two to three milliliters of ^{99m}Tc-PG containing 5-8 mCi of ^{99m}Tc was also injected in eight normal human subjects, followed by sequential imaging with a scintillation camera. In both the rabbit gallbladder and intestine, the activity of the ^{99m}Tc compound per gram was more than 10 times that for blood from 5 min to 2 hr after the injection, indicating that the pharmaceutical is rapidly cleared from the blood by the liver and a fraction is rapidly excreted through the common bile duct into the duodenum. The equilibrium concentration of activity in the gallbladder was reached within 5 min. Within 2 hr, a large amount of the ^{99m}Tc activity (27.47 ± 6.5% of the dose) was excreted in the urine. The ^{131}I activity cleared the blood at a significantly slower rate than the ^{99m}Tc; a liver-to-blood ratio of 10:1 was not reached within the 2-hr analysis time. Ratios greater than 10 for gallbladder-to-blood and intestine-to-blood were reached 30 min after the injection. Urinary excrecion of ^{131}I was less than 3%. The results suggest that a more immediate visualization of the gallbladder is possible with ^{99m}Tc-PG than with ^{131}I-rose bengal because of its early high gallbladder-to-blood and gallbladder-to-liver ratios.

4764 BILIARY TRACT SCANNING WITH ^{99m}Tc-PYRIDOXYLIDENEGLUTAMATE: A NEW GALLBLADDER SCANNING AGENT. (Eng.) Matolo, N. M.; Stadalnik, R. C.; Krohn, K. A.; Jansholt, A.-L.; DeNardo, G. L.; Wolfman, E. F., Jr. (Univ. California Sch. Medicine, Davis, CA 95616). *Surgery* 80(3):317-321; 1976.

Biliary scanning with the new radiopharmaceutical, technetium-99m-pyridoxylideneglutamate (^{99m}Tc-PG), was performed on 15 dogs, 10 normal human volunteers, and 40 patients with hepatobiliary tract disease. The animals were divided into three groups: normal dogs, those with cystic duct ligation, and those with ligation of both the cystic duct and proximal portion of the common hepatic duct. In normal dogs and humans, the agent reached the liver in 5 min and reached the common bile duct (CBD), gallbladder, and duodenum in 10-15 min. Satisfactory images of the biliary tract were obtained with small doses (1-2 μCi) of ^{99m}Tc-PG. The gallbladder was not visualized when the cystic duct or proximal common hepatic duct was occluded. There was no concentration of ^{99m}Tc-PG in the gallbladder when a nonfunctioning gallbladder was demonstrated radiologically in the presence of acute cholecystitis, cystic duct obstruction, or in chronic cholecystitis. In partial CBD obstruction, a distended CBD was visualized, and there was delay in the transit of radioactivity into the duodenum. In complete CBD obstruction, no radioactivity was seen in the biliary and gastrointestinal tracts up to 24 hr after injection, but there was immediate and intense secretion of the radioactive agent into the urogenital system. In severe hepatocellular disease, delayed liver clearance and delayed visualization of the gallbladder were observed. There were no toxic or other untoward effects noted in any patient. Therefore the study can be used for evaluating patients with biliary tract disease. The advantages of biliary scanning include safety, simplicity, and availability, in addition to the fact that it can be performed in jaundiced patients as well as in those allergic to contrast agents used for cholangiography.

4765 ULTRASOUND EXAMINATION OF THE GALLBLADDER: AN ALTERNATIVE TO "DOUBLE-DOSE" ORAL CHOLECYSTOGRAPHY. (Eng.) Bartrum, R. J., Jr.; Crow, H. C.; Foote, S. R. (Dartmouth Univ. Medical Sch., Hanover, NH 03755). *JAMA* 236(10):1147-1148; 1976.

The gallbladders of 50 patients who had a nonvisualized gallbladder following a single 3-g dose of tyropanoate sodium were examined by ultrasound, and the accuracy of this procedure was compared with double dose p.o. cholecystography and with i.v. cholangiography. Gallstones were found at operation in 30 of the 50 patients; the ultrasound examination was positive in 28 of these. Of the remaining patients, the ultrasound examination was equivocal in one and false-negative in the other. In 29 of the 50 patients, the gallbladders remained nonvisualized on the double-dose p.o. cholecystogram. Eleven patients with nonvisualized double-dose cholecystograms also underwent i.v. cholangiography; seven gallbladders were visualized by this technique. The accuracy of ultrasonic cholecystography has been adequately demonstrated, and this procedure should be employed in instances of nonvisualization with single-dose p.o. cholecystography.

4766 DIAGNOSIS OF POSTEROLATERAL CONGENITAL DIAPHRAGMATIC (BOCHDALEK) HERNIA BY LIVER SCINTIGRAM: CASE REPORT. (Eng.) Yeung, W.-C.; Haines, J. E.; Larson, S. M. (Univ. Oregon Health Sciences Center, 3181 S.W. Sam Jackson Park Rd., Portland, OR 97201). *J. Nucl. Med.* 17(2):110-112; 1976.

Hepatic herniation through a right-sided posterolateral congenital diaphragmatic defect (Bochdalek) was diagnosed by ^{99m}Tc-sulfurcolloid scintigraphy in a 4-week-old boy, whose case report is presented. The liver scintigrams showed an oblique band of decreased radioactivity, divided the liver into an inferior anteromedial portion and a superior posterolateral portion. In spite of the markedly abnormal liver scintigram, other diagnostic studies, including pneumoperitoneum abdominal radiography, were negative. The liver scintigram can provide life-saving information in the diagnosis of congenital diaphragmatic hernia.

4767 SIGNIFICANCE OF PERITONEOSCOPIC EXAMINATION, DIRECT CHOLANGIOGRAPHY AND CYTOLOGICAL EXAMINATION OF ASPIRATED BILE IN THE DIAGNOSIS OF BILIARY AND PANCREATIC MALIGNANCIES. (Eng.) Kimura, R.; Wakui, K.; Ishioka, K.; Tadaki, H.; Yamagata, J.; Takeda, T.; Miura, K.; Otsuki, M.; Sugawara, T.; Yamagata, S. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 118(Suppl.):145-148; 1976.

The value of peritoneoscopic examination, direct cholangiography, and cytological examination of aspirated bile during direct cholangiography was studied in 140 cases of biliary and pancreatic malignant and nonmalignant diseases. The peritoneoscopic diagnosis was correct in 10 of 14 patients with gallbladder cancer, 6 of 20 patients with common bile duct cancer, and 6 of 25 patients with pancreatic cancer; the peritoneoscopic examination usually only revealed obstructive jaundice, and the malignancies that were correctly diagnosed were usually advanced. Forty-three of 71 cases of cholelithiasis were correctly diagnosed with peritoneoscopy. The correct diagnosis was made by direct cholangiography in all of 41 patients with cholelithiasis, in 10 of 11 patients with common bile duct stones, all of 8 patients with combined cholelithiasis and common bile duct stones, in 12 of 14 patients with gallbladder cancer, in 18 of 20 patients with common bile duct cancer, and in 20 of 24 patients with pancreatic cancer. Misinterpretation of the lesion occurred in 1 of 11 patients with common duct stone, and in 2 of 14 patients with gallbladder cancer, and in 2 patients with common duct stones. Cancer cells were detected by cytological examination of aspirated bile in 10 of 12 patients with gallbladder cancer, in 4 of 11 patients with common duct cancer, and in 5 of 11 patients with hepatic bile duct cancer. The detection rate of the cancer cells in the bile was increased when the lesion was closer to that of the aspiration site. It is concluded that the combination of these three methods will lead to correct diagnosis.

4768 THE DIAGNOSTIC VALUE OF BIOPSY OF THE PANCREAS IN PANCREATIC DISEASE. (Ita.) Marrano, D.; Giberti, D. (Istituto di Patologia Speciale Chirurgica e Propedeutica Clinica, Universita degli Studi di Bologna, Bologna, Italy). *Acta Chir. Ital.* 31(3):321-328; 1975.

A pancreatic biopsy should be performed only when absolutely necessary and in certain specific cases. It is of greatest value in tumors of the head of the pancreas, when the tumor is still well defined, when radical surgery is still possible, and when there are no other radiological or clinical means of confirming the diagnosis. Biopsy is of moderate usefulness in chronic relapsing pancreatitis. Results are largely dependent on the surgeon's experience, on the preparation of the specimen, and on the pathologist's interpretation.

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See also, 4612, 4830, 4832, 4850, 4854, 4869, 4871, 4878, 4881, 4883, 4908, 4918, 4921, 4922, 4924, 4925, 4975, 4982, 4995, 4997, 4998, 5000, 5038, 5044, 5046, 5048, 5056, 5058, 5071, 5082, 5200, 5218, 5223, 5238, 5350, 5354.

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GASTROINTESTINAL DISEASES

ESOPHAGUS

4826 LOWER ESOPHAGEAL SPHINCTER PRESSURE IN WOMEN USING SEQUENTIAL ORAL CONTRACEPTIVES. (Eng.) Van Thiel, D. H.; Gavaler, J. S.; Stremple, J. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Gastroenterology* 71(2):232-235; 1976.

Because symptomatic acid reflux and reflux esophagitis occur in some women during pregnancy, the effects of estrogen and progestins on lower esophageal sphincter (LES) pressure were studied by determining the LES pressure, basal gastric pH, and fasting plasma gastrin levels in seven women using sequential oral contraceptives. No difference in basal gastric pH or fasting plasma gastrin was observed during any of the three selected periods studied. LES pressure was the same during menses (20.8 ± 1.7 mm Hg) when the volunteers took no medication and during the phase of the cycle when the volunteers were ingesting ethinylestradiol (18.3 ± 1.7 mm Hg). LES pressure decreased significantly ($p<0.01$) to 9.4 ± 1.2 mm Hg during the phase of the cycle when the volunteer took dimethisterone as well as ethinylestradiol. It is therefore proposed that the progressive rise in plasma progesterone alone or in combination with estrogens that occurs during the course of pregnancy might be responsible for the increased incidence of symptomatic heartburn in pregnant women.

4827 LOWER ESOPHAGEAL SPHINCTER FUNCTION IN CHILDREN WITH AND WITHOUT GASTROESOPHAGEAL REFLUX. (Eng.) Moroz, S. P.; Espinoza, J.; Cumming, W. A.; Diamant, N. E. (Health Sciences Centre, 685 Bannatyne Ave., Winnipeg, Manitoba, Canada). *Gastroenterology* 71(2):236-241; 1976.

Studies were designed to determine: the normal range of lower esophageal sphincter (LES) and upper esophageal sphincter (UES) pressure in infants and children, the LES and UES pressures in infants and children with gastroesophageal reflux (GER), and the responsiveness of the LES to bethanechol chloride in controls and children with GER. LES pressure was assessed in 62 control children and 35 GER children (aged 2 weeks-12 yr). In control subjects, LES pressure was well developed by 2 weeks of age, and at less than 1 yr, the mean LES pressure (43.3 ± 2.4 mm Hg) was significantly greater than that (30.6 ± 2.3 mm Hg) in children older than 1 yr. LES length increased with age. Bethanechol chloride (0.1 mg/kg, s.c.) caused a rise in LES pressure that increased in magnitude as LES resting pressure increased. In the 35 patients with GER, only 16 children had LES pressures below the normal range for their age group. LES length was shorter than control values in children over 6 months of age; hiatus hernia occurred in only five GER patients. Clinical improvement occurred in 15 of 16 infants treated with thickened feedings and upright posturing after meals. Six of these infants had low LES pressure; of the three who were followed up, the LES pressure returned to normal in two, one of whom also had hiatus hernia. Bethanechol chloride caused a change and an absolute rise in LES pressure that were not significantly different from those observed in controls. These results indicate that in infants and children, low LES pressure is not the sole determinant of GER, and that pharmacological stimulation of the LES could be a useful adjunct to the management of GER.

4828 MEDIASTINAL HISTOPLASMOSIS WITH ESOPHAGEAL ABSCESS: TWO CASE REPORTS. (Eng.) Jenkins, D. W.; Fisk, D. E.; Byrd, R. B. (United States Air Force Medical Center, Lackland Air Force Base, TX 78236). *Gastroenterology* 70(1):109-111; 1976.

The case reports of two patients who had ulcerated lesions of the esophagus secondary to *Histoplasma capsulatum*-infected mediastinal nodes are presented. The sudden onset of dysphagia heralded the onset of the disease in both patients. In the first patient, a 13-yr-old boy, a well documented episode of acute histoplasmosis approximately 13 months earlier suggested the diagnosis. At the time of the acute infection, his complement-fixing activity to the Histoplasma organism was 1:128 in the yeast phase and 1:16 in the histoplasmin phase; at the time of the mediastinal node infection, the yeast phase titer was 1:128, and the histoplasmin phase was 1:8. A lesion with a central ulcer was seen protruding into the esophagus posteriorly on an esophagogram, and was confirmed by esophagoscopy. After 2 months of therapy with amphotericin B (total dose, 1,200 mg), the dysphagia resolved, and repeat esophagoscopies were normal. The second patient, a 37-yr-old man, had no previous history of acute histoplasmosis infection, and it was believed that he probably had esophageal obstruction from an impacted foreign body. Fungal serologies showed a reaction of 1:8 to *Histoplasma* in the yeast phase only with negative precipitin reactions. Esophagoscopy revealed a submucosal mass protruding into the esophagus with purulent material oozing from the tip. At surgery, *Histoplasma*-infected mediastinal nodes were discovered. A portion of the mass of abnormal nodes was removed, but that part in contact with the esophagus had to be left intact. The resected mass was filled with caseous material, and areas of necrosis surrounded by epitheliod giant cells were noted. The symptoms resolved after 4 months of treatment with amphotericin B (total dose, 1,500 mg), although the yeast phase complement fixation titer remained elevated at 1:32, 7 months after surgery. Although there was significant elevation in the fungal titers only in the first patient, the authors believe that fungal serologies and precipitin bands should be obtained in all patients with symptoms suggestive of a chronic mediastinal abscess.

4829 THE HISTOLOGIC SPECTRUM OF BARRETT'S ESOPHAGUS. (Eng.) Paull, A.; Trier, J. S.; Dalton, M. D.; Camp, R. C.; Loeb, P.; Goyal, R. K. (Peter Bent Brigham Hosp., 721 Huntington

Ave., Boston, MA 02115). *N. Engl. J. Med.* 295(9): 476-480; 1976.

Biopsy specimens were taken from various levels of the esophagus of 11 patients with Barrett's esophagus (columnar-lined esophagus), and their histology was studied. There were three types of columnar epithelia above the lower esophageal sphincter: atrophic gastric-fundic-type epithelium with parietal and chief cells; junctional-type epithelium with cardiac mucous glands; and distinctive specialized columnar epithelium with a villiform surface, mucous glands, and intestinal-type goblet cells. When present, specialized columnar epithelium was always the most proximal, and gastric fundic epithelium was the most distal epithelium. Junctional epithelium was interposed between gastric fundic and specialized columnar or squamous epithelium. Four patients had unequivocal esophagitis in squamous epithelium, but its presence and severity did not correlate with inflammation or length or type of distal columnar epithelium. The heterogeneity of epithelial patterns in the columnar-lined esophagus explains prior discrepant reports in which only single, though diverse, epithelial patterns were described.

4830 INTRAPHRENIC ESOPHAGEAL LEIOMYOMA ASSOCIATED WITH DIVERTICULA PREOPERATIVELY DIAGNOSED BY ANGIOGRAPHY. (Eng.) Gothlin, J.; Bloch, R.; Sundgren, R. (Univ. Hosp., S-221 85 Lund, Sweden). *Acta Radiol.* [*Diagn.*] *(Stockh.)* 16(6):673-678; 1975.

Two cases of esophageal leiomyoma associated with diverticulum are described. In both patients, a 26-yr-old woman and a 37-yr-old man, a thin layer of the diaphragm covered the proximal portion of the tumor, suggesting that each originated between the two layers of the diaphragm, pushing the parietal layer upward. In the first case, the tumor extended through the hiatus into the abdominal cavity, presumably by secondary growth. The preoperative radiological findings had suggested a hiatal hernia, but selective angiography revealed the diverticula and leiomyoma. The posterior esophageal branch of the left gastric artery passed into the medioventral portion of the diverticulum. The posterior branch of the left phrenic artery followed the cranial surface of the diverticulum, indicating its subphrenic localization. In the second patient, the left lobe of the liver was vascularized by the left gastric artery. Only the posterior branch of the left inferior phrenic artery came from the left gastric artery, while the origin of the anterior branch was not demonstrated. The anterior and posterior esophageal branches passed into the anterior portion of the mass, which was vascularized mainly by the posterior branch from the inferior phrenic artery. It passed into the caudal part of the mass, indicating that it was subphrenically located, but more cranially located than in the first patient. Both patients were fully recovered 2-3 months after left-sided thoracotomy, at which time enucleation of the mass and extirpation of the diverticulum in case 1 were performed. Selective angiography may distinguish between diverticula and hiatal hernia and may disclose a benign tumor.

4831 ERRORS, HAZARDS AND COMPLICATIONS IN ESOPHAGEAL ALLOPLASTY. (Rus.) Krivonogov, I. B. (Chita Medical Inst., Chita, USSR). *Vestn. Khir.* 115(10):102-104; 1975.

4832 pH STUDIES OF THE ESOPHAGUS. (Ita.) Querci della Rovere, G.; Guidi, G. C.; Menini, A.; Motton, G.; Fracastoro, G.; Saggiorato, R.; Cardiano, C. (Istituto di Patologia Speciale Chirurgica e Propedeutica Clinica, Universita di Padova, Padova, Italy). *Acta Chir. Ital.* 31(2):143-157; 1975.

4833 VALIDITY OF ENDOLUMINAL MANOMETRY AND OF BERNSTEIN'S TEST IN THE STUDY OF ESOPHAGITIS FROM REFLUX. (Ita.) Deodato, G.; Banna, P.; Prestianni, B.; Monello, S.; Consoli, A.; D'Arti, C. (Istituto di Chirurgia Toracica, Universita di Catania, Catania, Italy). *Chir. Ital.* 26(6):857-877; 1974.

4834 TOTAL SUBSTITUTION OF THE ESOPHAGUS AFTER RESECTION OR AS A TEMPORARY MEASURE. (Ger.) Bottger, G.; Kolokythas, A. (Chirurg. Klinik, Stadt. Krankenhaus, D-9720 Schweinfurt, W. Germany). *Munch. Med. Wochenschr.* 117(39):1537-1540; 1975.

4835 ETIOLOGY OF ESOPHAGEAL ATRESIA. (Ger.) Scharli, A. F. (Kinderspital Luzern, CH-6000 Luzern, Switzerland). *Z. Kinderchir.* 16(4): 374-375; 1975.

4836 X-RAY FINDINGS IN PEDIATRIC SURGICAL EMERGENCIES: (11). CONGENITAL ATRESIA OF THE ESOPHAGUS. (Jpn.) Matsuyama, S.; Mogami, K.; Nagashima, K.; Suzuki, N.; Ohama, Y. (Dept. Surgery, Gunma Univ. Sch. Medicine, Maebashi, Japan). *Kitakanto Med. J.* 25(1):33-36; 1975.

4837 BENIGN DISEASES OF THE ESOPHAGUS FROM THE ASPECT OF INTERNAL MEDICINE. (Ger.) Wienbeck, M. (Medizinische Einrichtungen der Universitat, II. Medizinische Klinik und Poliklinik, Moorenstrasse 5, D-4000 Dusseldorf 1, W. Germany). *Z. Gastroenterol.* 14:138-147; 1976.

4838 BENIGN DISEASES OF THE ESOPHAGUS. (Ger.) Zangl, A. (II. chir. Abt. des Landeskrankenhauses Salzburg, Salzburg, Austria). *Z. Gastroenterol.* 14:148-153; 1976.

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4840 THE ESOPHAGUS. ANATOMIC, FUNCTIONAL, RADIOLOGICAL AND CLINICAL STUDY. DEGLUTITION: X. CANCER OF THE ESOPHAGUS (PART 1). (Fre.) Nemours-Auguste, S.; Barag, N. (Hopital Paul-Brousse, 14 avenue Paul-Vaillant-Couturier, 94 Villejuif, France). *Ouest Med.* 28(18):1251-1288; 1975.

4841 BLEOMYCIN IN COMPLEX TREATMENT OF ESOPHAGEAL CANCER. (Rus.) Ivanova, E. M.; Khlebnov, A. V.; Tseshkovsky, M. S. (Inst. Experimental and Clinical Oncology, USSR Acad. Medical Sciences, Moscow, USSR). *Klin. Med.* 54(2):91-95; 1976.

4842 CLINICO-ROENTGENOLOGICAL ASSESSMENT OF THE CONDITION OF THE ESOPHAGUS AFTER RADIATION THERAPY FOR ESOPHAGEAL CANCER. (Rus.) Tikhonov, K. B.; Strashinin, A. I.; Gerasimyak, V. G.; Pruchansky, V. S. (Central Scientific Res. Inst. Radiology, USSR Ministry of Health, USSR). *Med. Radiol. (Mosk.)* 21(2):8-12; 1976.

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4845 CARCINOMA OF THE THORACIC PART OF THE ESOPHAGUS IN GASTRECTOMIZED PATIENTS. TECHNICAL PROBLEMS. (Fre.) Negre, E.; Chardenon, P.; Caporiccio, A.; Giordan, J. (Cliniques Saint-Eloi, C.H.U., 34059 Montpellier Cedex, France). *J. Chir. (Paris)* 110(3):217-224; 1975.

4846 POSTOPERATIVE STENOTIC ESOPHAGITIS. 11 CASES SEEN AFTER OPERATIONS INVOLVING THE ESOPHAGEAL HIATUS. (Fre.) Viard, H.; Favre, J.-P.; Petiot, A. (Clinique Chirurgicale, Faculte de Medecine de Dijon, Hopital du Bocage, F 21000 Dijon, France). *Chirurgie* 101(8):577-581; 1975.

4847 COMPLICATIONS OF DIAPHRAGMATIC HERNIA. (Rus.) Shevchuk, M. G.; Seredyuk, N. N.; Tkachuk, L. I.; Ostafiychuk, M. I.; Furda, M. D.; Proskurnitsky, I. M.; Kosmochuk, V. S. (Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Klin. Med.* 54(2):137-138; 1976.

4848 ERRORS IN THE DIAGNOSIS OF DIAPHRAGMATIC HERNIA. (Rus.) Meliagina, E. M. (Aktyubinsk Oblast Children's Hosp., Aktyubinsk, USSR). *Vestn. Khir.* 116(2):136-137; 1976.

4849 THE SPECIFICITY OF THE SYMPTOMS OF HIATUS HERNIA. (Spa.) Schaposnik, F.; Salvioli, M. V.; Soccia, S. C.; Acebal, E. (Catedra de Medicina Interna "D," Facultad de Medicina de La Plata, La Plata, Argentina). *Prensa Med. Argent.* 62(5):93-96; 1975.

4850 HIATUS HERNIAS. PART 2. RADIOLOGICAL STUDY OF HIATUS HERNIAS. (Fre.) Bloch, P. (Service de Radiologie, Centre Hospitalier Universitaire, Strasbourg, France). *J. Med. Strasbourg* 7(1):17-21; 1976.

4851 GASTROESOPHAGEAL REFLUX IN YOUNG CHILDREN AND INFANTS. (Fre.) Alain, J. L. (Chirurgie Infantile, C.H.U., 87000 Limoges, France). *Rev. Pediatr. (Paris)* 11(7):353-356, 359-362; 1975.

4852 STUDY OF PREVENTION AGAINST POSTOPERATIVE REFLUX ESOPHAGITIS FROM THE LOWER ESOPHAGUS AND THE CARDIA CANCER. (Jpn.) Miyamoto, Y. (Sch. Medicine, Gunma Univ., Maebashi, Japan). *Kitakanto* Japan). *KitaKanto Med. J.* 25(1):1-20; 1975.

4853 CONSERVATIVE THERAPY FOR CICATICIAL ESOPHAGEAL STENOSES. (Rus.) Rusanova, N. I. (Leningrad Medical Inst. Pediatrics, Leningrad, USSR). *Vestn. Khir.* 115(10):19-23; 1975.

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4857 MALLORY-WEISS SYNDROME. A REVIEW. (Fre.) Faivre, J.; Lambert, R.; Baux, N.; Moulinier, B. (Hopital E.-Herriot, F 69374 Lyon Cedex 2, France). *Arch. Fr. Mal. App. Dig.* 65(1):53-59; 1976.

See also, 4646, 4776, 4862, 4878, 4879, 4968.

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4858 FASTING SERUM GASTRIN AND BASAL GASTRIC ACID SECRETION.

(Eng.) Petersen, H.; Schrumpf, E.; Myren, J. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 10(7):721-724; 1975.

The relation between serum gastrin (SG) and basal acid secretion (BAO) was studied in 20 healthy young subjects; in 20 patients with various gastrointestinal complaints, but without previous or present ulcer disease; and in 20, 16, and 15 patients with duodenal, pyloric, and gastric ulcer, resp. The gastric secretion of acid was examined 30 min basally and in response to stepwise increasing doses of pentagastrin (0.028, 0.166, 1, and 6 μg/kg/hr). None of the subjects showed basal anacidity. A significant positive correlation was found between the SG concentration and BAO only in the subjects without ulcer; this was mainly due to a close correlation in the 20 healthy volunteers. When BAO and SG were expressed as proportions of calculated maximal acid response (Vmax) and half maximal dose of pentagastrin, resp., the positive correlation between SG and BAO was improved and reached significance also in the individuals with duodenal ulcers. The findings suggest that the serum concentration of gastrin plays a role in the basal gastric secretion.

4859 REDUCTION OF GASTRIC AMMONIA BY AMPICILLIN IN NORMAL AND AZOTEMIC SUBJECTS.

(Eng.) Meyers, S.; Lieber, C. S. (Veterans Admin. Hosp., Bronx, New York, NY 10468). *Gastroenterology* 70(2):244-247; 1976.

The capacity of ampicillin to reduce gastric ammonia production was tested in basal and betazole-stimulated (1.7 mg/kg, i.m.) gastric secretion in 26 subjects. A 7-day course of ampicillin (4 g/day, p.o.) reduced basal gastric ammonia concentration from 5.5 ± 1.4 to 1.8 ± 0.3 mM and post-betazole ammonia from 4.7 ± 0.9 to 1.3 ± 0.3 mM ($p<0.01$) in seven normal control subjects. Similar results were obtained after neomycin (4 g/day, p.o.) or i.m.-administered ampicillin (4 g/day), each given to a separate group of seven control subjects. In five azotemic patients, p.o. ampicillin treatment resulted in a reduction of ammonia concentration from 16.3 ± 4.7 to 3.1 ± 0.7 mM in basal secretion and from 18.3 ± 8.1 to 2.3 ± 0.6 mM in betazole-stimulated gastric juice ($p<0.01$). Antibiotic therapy did not alter the volume of gastric secretion. Gastric acidity appeared lower in azotemic patients and increased significantly after treatment, indicating that the higher ammonia content could account for at least part of the hypoacidity. Because ampicillin is active orally as well as parenterally and can be readily used in renal failure, it may be useful for the treatment of hepatic encephalopathy, especially in the azotemic patient in whom neomycin is toxic.

4860 HUMAN GASTRIN RESPONSE TO SECRETIN AFTER VAGOTOMY.

(Eng.) McLaughlin, M.; Peskin, G. W.; Saik, R. P. (Dept. Surg., Univ. California, San Diego, CA). *Am. J. Surg.* 131(1):69-72; 1976.

To determine if the elevation in serum gastrin levels after secretin infusion in patients with Zollinger-Ellison tumors can be used as a diagnostic marker, the gastrin response to a liquid meal with and without secretin infusion was studied in nine patients undergoing selective or truncal vagotomy with pyloroplasty for duodenal ulcer disease. Fasting basal gastrin levels were significantly increased in eight patients after vagotomy (before vagotomy, 10-115 pg/ml; after, 55-177 pg/ml), but secretin infusion (2 U/kg/hr) did not consistently suppress these levels, either pre- or postoperatively. Infusion of secretin significantly lowered the integrated gastrin response to feeding, both preoperatively (before secretin, 30-1,300 pg/min/ml; after secretin, 13-98 pg/min/ml) and postoperatively (before, 6-603 pg/min/ml; after, 4-470 pg/min/ml), and in eight of nine patients. Vagotomy alone did not significantly alter the integrated gastrin response to feeding. This suggests that secretin infusion remains a helpful diagnostic test, differentiating patients with recurrent ulcer and elevated gastrin levels postvagotomy from patients with occult Zollinger-Ellison syndrome.

4861 EPIDEMIOLOGY OF CANCER OF THE STOMACH WITH SPECIAL REFERENCE TO ITS RECENT DECREASE IN JAPAN.

(Eng.) Hirayama, T. (National Cancer Res. Inst., Tokyo, Japan). *Cancer Res.* 35(11, part 2):3460-3463; 1975.

The epidemiology of stomach cancer and its recent decline in Japan were examined. Data were taken from vital statistics and the results of the National Nutritional Survey. Between 1955 and 1973, the age-specific death rate for stomach cancer declined 25% in 40- to 44-yr-old men and women. In the 45- to 49-yr-old group, the death rates declined 34% for men and 22% for women. Death rates decreased by 35% for men and 30% for women in the 50- to 54-yr-old group. The reductions in the 55-59 and 60- to 64-yr-old groups were 30% in each group for men and 31 and 28%, resp., for women. In the 65- to 69-yr-old group, the death rate declined 19% for men and 31% for women. From 1949 to 1971, milk comsumption in Japan increased 20 times, and egg consumption increased 13.4 times. Oil consumption increased 9.6 times, meat consumption, 8.7 times, and fruit consumption, 3.7 times. No change occurred in the consumption of fish, rice, and vegetables. A retrospective study showed significantly less cancer in people who drink two or more glasses of milk a day. There was less than one-third as much stomach cancer in nonsmoking milk drinkers as smoking milk drinkers. The decline in stomach cancer may be attributed, in part, to increased milk consumption and to an early detection program for cancer.

4862 GASTROESOPHAGEAL REFLUX IN ESOPHAGEAL SCLERODERMA: DIAGNOSIS AND IMPLICATIONS.

(Eng.) Orringer, M. B.; Dabich, L.; Zarafonetis, C. J. D.; Sloan, H. (C-7175 Univ. Hosp., Ann Arbor, MI 48109). *Ann. Thorac. Surg.* 22(2):120-130; 1976.

To define precisely the pathophysiology of esophageal involvement in scleroderma, and to evaluate the place of surgery in the management of gastroesophageal reflux in these patients, the history, barium swallow results, and the results of esophageal function tests were evaluated in 53 patients. The most common esophageal symptoms were heartburn and dysphagia, which were seen in 36 and 27 paients, resp. Abnormal motility was seen radiologically in 43 patients, but gastroesophageal reflux was seen in only 9. Esophageal function tests demonstrated: an abnormal motility in 51 patients and lack of a distal esophageal high-pressure zone in 18, moderate to severe gastroesophageal reflux in 38 patients, and abnormal acid-clearing ability in 50 patients. Eleven patients, including eight with peptic stricture, underwent the combined Collis-Belsey operation. Reflux was abolished in all patients, and dysphagia was abolished in 10. Roentgenograms showed that regression of strictures was complete in five patients and partial in three. Postoperative esophageal function tests in nine patients demonstrated a competent distal esophageal valvular mechanism in seven. Gastroesophageal reflux, not impaired motility, is the major cause of esophageal symptoms in scleroderma. Its effective operative control is not contraindicated by systemic disease.

4863 LYMPHORETICULAR HYPERPLASIA OF THE STOMACH (PSEUDOLYMPHOMA). (Eng.) Martel, W.; Abell, M. R.; Allan, T. N. K. (Univ. Michigan Medical Center, Ann Arbor, MI 48104). *Am. J. Roentgenol.* 127(2):261-265; 1976.

Three cases of chronic peptic ulcer combined with gastric lymphoreticular hyperplasia with long-term follow-up are reported. Epigastric pain and weight loss were common to all three patients. All patients had an ulcerating tumor mass associated with regional or generalized enlargement of the rugae of the stomach. In the first patient, a 17-yr-old boy, surgical exploration revealed an 8 x 5-cm mass on the lesser curvature of the stomach adjacent to multiple enlarged lymph nodes; biopsy and frozen sections indicated an erroneous diagnosis of lymphoma, and a subtotal gastrectomy and gastroenterostomy were performed. In the second patient, a 59-yr-old man, subtotal gastrectomy and gastroenterostomy were performed when an antral mass extending to the serosa and enlarged pyloric lymph nodes were discovered. A firm, raised gastric lesion with a central ulcer involved the mucosa just proximal to the antrum. In the third patient, a 56-yr-old man, a subtotal gastrectomy and gastrojejunostomy were performed when a large antral ulcer was erroneously diagnosed as a malignant gastric lymphoma. The x-rays of this patient showed an irregular ulcerated lesion on the greater curvature of the stomach. The ulcer was within a mass that could only be discerned on spot films with compression, indicating that it represented an ulcer within an intraluminal mass; since this is a salient feature of Carmen's sign, which has been regarded as pathognomonic of an ulcerating carcinoma, it appears that this case is exceptional. The microscopic sections of the stomach in all three patients confirmed the presence of a chronic peptic ulcer whose base was covered by a thin, purulent, and a fibrinous exudate. Hyaline fibrous scar tissue extended deep into the underlying wall, replacing much of the muscularis. Throughout this scar, there were nodules and cords of hyperplastic lymphoreticular cells and scattered plasma cells. The mucosa and submucosa at the margin of the ulcer were infiltrated by proliferating lymphoreticular cells and plasma cells; although the cells of the infiltrate were hyperplastic, neither the pattern of involvement nor the cytologic features were those of malignant lymphoma, and the regional lymph nodes showed no evidence of malignancy. Patients 1 and 3 had other ulcers in the stomach and duodenum, suggesting that multiple ulcers might be more likely to occur in patients with lymphoreticular hyperplasia of the stomach. When the first two patients were reexamined, 13 and 9 yr after operation, resp., both were completely asymptomatic.

4864 IMMEDIATE ENDOSCOPIC DIAGNOSIS OF UPPER GASTROINTESTINAL BLEEDING: ITS ACCURACY AND VALUE IN RELATION TO ASSOCIATED PATHOLOGY. (Eng.) Josen, A. S.; Giuliani, E.; Voorhees, A. B., Jr.; Ferrer, J. M., Jr. (Harlem Hosp. Center, 506 Lenox Ave., Room 11106, New York, NY 10037). *Arch. Surg.* 111(9):980-986; 1976.

The use of endoscopy to identify the source of upper gastrointestinal bleeding was evaluated in 262 patients with active upper gastrointestinal (GI) bleeding who underwent panendoscopy between July 1970 and March 1973. There was 100% accuracy of endoscopic diagnosis as to the anatomical site of bleeding; the etiopathologic definition was 94.7% accurate. The series was divided into two groups, 116 with liver disease and 146 without liver disease. There were 107 patients with varices; 21 without liver disease (small varices) and 86 with liver disease (39 small and 47 large varices). All had associated gastritis. Only 27% of the patients in the liver disease group with varices (cirrhotics) had frank variceal hemorrhage, whereas 57% bled from hemorrhagic gastritis. The diagnostic unit provided early diagnosis, meaningful therapy, organized data gathering, and rough estimates of ultimate prognosis.

4865 NONSURGICAL CONTROL OF MASSIVE ACUTE GASTRIC MUCOSAL HEMORRHAGE WITH ANTACID NEUTRALIZATION OF GASTRIC CONTENT. (Eng.) Simonian, S. J.; Stratoudakis, A.; Lawrence, M.; Mungas, J.; Blackstone, M. O. (Univ. Chicago Pritzker Sch. Medicine, 950 E. Fifty-Ninth St., Chicago, IL 60637). *Surg. Clin. North Am.* 56(1):21-27; 1976.

A simple, safe method of treatment for control of massive acute gastric mucosal hemorrhage is described, and the results of studies comparing 20 patients treated with this method with 15 conventionally-treated patients are presented. The procedure was developed from the observation that gastric HCl played a central role in perpetuating the syndrome. The treatment consists of neutralizing the gastric acid with antacid (60-180 ml of magaldrate/hr, to a pH of 7.0), administered by nasogastric tube. Nineteen of 20 patients treated with this technique stopped bleeding; the remaining patient required surgery. There were no deaths. In contrast, 10 of 15 patients treated with conventional therapy [iced saline lavage and minimal (30 ml/hr) quantities of antacid] stopped bleeding. Four of the remaining patients required surgery, and all five patients eventually died, two of rebleeding following surgery. Of the 19 patients in whom bleeding had been controlled by neutralization, rebleeding occurred in 2; it was controlled in both cases by further neutralization. It appears that this method allows the bleeding to stop by natural clotting and enhances the regenerative healing of the gastric mucosa.

4866 GASTRITIS AND GASTRIC BLOOD FLOW IN HYPERDYNAMIC SEPTIC PIGS. (Eng.) Lucas, C. E.; Ravikant, T.; Walt, A. J. (Wayne State Univ. Sch. Medicine, 540 East Canfield St., Detroit, MI 48201). *Am. J. Surg.* 131(1):73-77; 1976.

Experiments were designed to determine the gastric hemodynamics in a septic model that causes both a hyperdynamic state and acute erosive gastritis. Sepsis was established in 12 pigs by the i.m. shank injection of *Pastuerella multocida* (42 x 10^8 colonies) in triptose phosphate broth; 4 pigs received sterile broth injections (shams), and 8 received sterile saline injections (controls). After 18 hr, cardiac output was measured by both the cardiogreen dilution technique and the radioactive microsphere dilution technique; cardiac output was then compared to total and regional gastric blood flow measured by radioactive microsphere entrapment. Acute erosive gastritis developed in septic pigs in the fundus and body of the stomach; the antrum was spared. Cardiac output was significantly increased in septic pigs (585 ml/min/kg) compared with sham (344 ml/min/kg, $p<0.025$) and control pigs (319 ml/min/kg, $p<0.005$). Total gastric blood flow in the septic pigs (1.22 ml/min/g) and regional blood flow to the fundus (35% of total gastric flow), body (42%), and antrum (23%), were also increased in direct proportion to the increase in cardiac output. These data suggest that acute erosive gastritis is primarily due to an end-organ cellular insult from sepsis, and is not primarily due to a decrease or redistribution in gastric blood flow.

4867 SERUM GASTRIN LEVELS IN CONGENITAL HYPERTROPHIC PYLORIC STENOSIS. (Eng.) Spitz, L.; Zail, S. S. (Children's Hosp., Western Bank, Sheffield S10 2TH, England). *J. Pediatr. Surg.* 11 (1):33-35; 1976.

The hypothesis that, in the presence of the requisite genetic factors, perinatal stress acting via gastrin produces hypertrophic pyloric stenosis was tested by measuring serum gastrin levels in infants with this congenital defect. Blood samples were obtained from 18 infants before surgery (Ramstedt pyloromyotomy) for hypertrophic pyloric stenosis; further samples were taken from 10 3-hr fasted infants on the fourth postoperative day. Control fasting specimens were obtained preoperatively from 10 age- and sex-matched control infants who underwent unrelated minor surgery. The mean serum gastrin level of the index patients preoperatively was 170.50 pg/ml, compared with a mean in control cases of 99.60 pg/ml. The serum gastrin levels in all cases increased postoperatively to a mean of 204.40 pg/ml. All differences were significant ($p=0.0015$).
It remains uncertain as to whether the hypergastrinemia in infants with congenital hypertrophic pyloric stenosis is a cause or effect of the pyloric obstruction. The evidence suggests that gastrin may play a small but significant part in the pathogenesis of the condition, but the authors believe that the major cause of the high serum gastrin levels is mechanical antral distension secondary to the obstruction.

4868 CHRONIC GASTRIC ULCER IN THE RAT PRODUCED BY WOUNDING AT THE FUNDO-ANTRAL JUNCTION. (Eng.) Wong, J.; Loewenthal, J. (Dept. Surgery, Univ. Sydney, Sydney, New South Wales, Australia). *Gastroenterology* 71(3):416-420; 1976.

The rates of wound healing at different sites in the stomach, especially at the fundo-antral junction, were evaluated in albino rats. Standardized 8-mm mucosal wounds were made in the stomach at the rumeno-fundic junction, fundus, fundo-antral junction, and antrum, and examined at intervals up to 8 months. All wounds at the rumeno-fundic junction and fundus were healed within 4 weeks, and those at the antrum were healed within 12 weeks. The majority of wounds at the fundo-antral junction remained chronic, and at 8 months, 41 of 50 rats still had ulcers 2 mm or greater in diameter. These findings suggest that the fundo-antral junction susceptible to the development of chronic ulcers. This is a simple and reliable method of producing chronic gastric ulcers and does not alter the continuity or disturb the function of the gastrointestinal tract.

4869 STUDIES ON SELECTIVE ANGIOGRAPHY OF GASTRIC LESIONS. (Jpn.) Nomura, M. (Kurume Univ. Sch. Medicine, Kurume, Japan). *Acta Med. (Fukuoka)* 45(3):20-41; 1975.

4870 PROBLEM OF EARLY DIAGNOSIS OF GASTRIC CARCINOMA. (Rus.) Salupere, V. P.; Maaroos, Kh. G.; Mikhklissar, M. M.; Kutsar, T. Kh.; Remmel, Kh. A. (Dept. Therapy, Tartu Univ., Tartu, USSR). *Klin. Med.* 54(2):85-88; 1976.

4871 DIAGNOSTIC EFFICIENCY OF GASTROSCOPY IN ATROPHIC GASTRITIS. (Ger.) Hampel, K. E.; Stopik, D.; Niedobitek, F. (Medizinische Klinik und Poliklinik, Freie Universitat Berlin, D 1000 Berlin 19, Spandauer Damm 130, W. Germany). *Leber Magen Darm* 5(3):96-98; 1975.

4872 ENDOSCOPIC POLYPECTOMY OF THE UPPER GASTROINTESTINAL TRACT: RESULTS AND CLINICAL FEATURES. (Ger.) Singer, M.; Busse, R.;

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Seib, H.-J.; Elster, K.; Ottenjann, R. (I. Medizinische Abteilung, Stadtisches Krankenhaus Munchen-Neuperlach, 8 Munich 83, Oskar-Maria-Graf-Ring 51, W. Germany). *Dtsch. Med. Wochenschr.* 100(45):2313-2316; 1975.

4873 METHODS OF ENDOSCOPIC REMOVAL OF GASTRIC POLYPS. (Rus.) Pantsyrev, Yu. M.; Gallinger, Yu. I. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (2):111-116; 1976.

4874 LOCAL POSTOPERATIVE COMPLICATIONS FOLLOWING SURGERY ON THE CARDIA. (Ger.) Zierott, G.; Brieler, H. S. (Chirurgische Universitatsklinik, D-23 Kiel, Hospitalstr. 40, W. Germany). *Chirurg* 46(9):410-413; 1975.

4875 GASTRIC RESECTION (BILLROTH II) AND EXOCRINE PANCREAS FUNCTION [Abstract]. (Ger.) Tymper, F.; Rosch, W.; Domschke, W.; Demling, L. (No affiliation given). *Z. Gastroenterol.* 14:248; 1976.

4876 COMPLICATIONS OF RECONSTRUCTIVE JEJUNOGASTROPLASTY IN THE LATE POSTOPERATIVE PERIOD. (Rus.) Samokhvalov, V. I. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Vestn. Khir.* 115(10):12-16; 1975.

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4905 ACUTE HEMORRHAGE OF THE UPPER DIGESTIVE TRACT WITH SPECIAL REGARD TO STRESS ULCER. PROPHYLAXIS AND SURGICAL TREATMENT. (Ger.) Dinstl, K. (1. Chir. Univ.-Klinik, Alser Strasse 4, A-1090 Vienna, Austria). *Z. Gastroenterol.* 14:179-186; 1976.

4906 THE VOLUME OF CIRCULATING BLOOD AND REGIONAL HEMODYNAMICS IN ACUTE GASTRODUODENAL HEMORRHAGES. (Rus.) Lutsenko, S. M.; Kharchenko, V. G.; Bachurin, V. I.; Lomakin, M. M. (Zaporozhye Medical Inst., Zaporozhye, USSR). *Sov. Med.* (2):38-41; 1976.

See also, 4591, 4640, 4642, 4643, 4651, 4754, 4755,
4759, 4771, 4776, 4814, 4815, 4816, 4818,
4819, 4822, 4823, 4845, 4851, 4852, 4857,
4908, 4933, 4935, 4936, 4949, 4953, 4963,
5288, 5294, 5295, 5329, 5330, 5345, 5359.

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STOMACH

Peptic Ulcers

4907 INHIBITORY EFFECT OF A CAERULEIN-LIKE PEPTIDE ON HUMAN GASTRIC SECRETION.

(Eng.) Agosti, A.; Missale, G.; Bertaccini, G. (Dept. Gastroenterology, Univ. Parma, Parma, Italy). *Eur. J. Pharmacol.* 38(1):193-195; 1976.

The effect of a cerulein-like peptide on gastric secretion was studied in 10 patients with duodenal ulcer. The synthetic heptapeptide corresponds to the C-terminal heptapeptide of cerulein, but is characterized by a norleucine residue replacing the methionine residue of cerulein. When the heptapeptide was infused i.v. (2 μg/kg/hr) in five patients, pentagastrin (4 μg/kg/hr)-stimulated gastric secretion was inhibited by 70-80%. The infusion of the heptapeptide alone caused a slight increase in gastric secretion in the remaining five patients. The compound caused no side effects and exhibited a prolonged effect that was evident even after discontinuing the infusion. This peptide is probably the best cerulein analogue acting as a competitive inhibitor of pentagastrin-induced secretion.

4908 THE EFFECT OF INTRAVENOUS THEOPHYLLINE ETHYLENEDIAMINE ON SERUM GASTRIN CONCENTRATION IN CONTROL SUBJECTS AND PATIENTS WITH DUODENAL ULCERS AND ZOLLINGER-ELLISON SYNDROME.

(Eng.) Feurle, G.; Arnold, R.; Helmstadter, V.; Creutzfeldt, W. (Medizinische Poliklinik, Universitat Heidelberg, Hospitalstrasse 3, D-69 Heidelberg, W. Germany). *Digestion* 14(3):227-231; 1976.

The value of the i.v. infusion of aminophylline in the differential diagnosis of the Zollinger-Ellison syndrome was tested. Serum gastrin concentrations were measured after theophylline ethylenediamine (5-6 mg/kg for 5 min) was infused in 10 patients with duodenal ulcer, 9 patients with the Zollinger-Ellison syndrome, 7 normal control subjects, and 3 patients with pernicious anemia. All but two patients with the Zollinger-Ellison syndrome had been totally gastrectomized. A significant increase in serum gastrin (i.e., >20%) occurred in five controls, six patients with duodenal ulcer, eight patients with the Zollinger-Ellison syndrome, and all three patients with pernicious anemia. It is concluded that an aminophylline test would not be useful in the differential diagnosis of the Zollinger-Ellison syndrome.

4909 CONGENITAL CAUSES OF DUODENAL ULCERS IN ADULTS.

(Eng.) Naylor, R. G.; Juler, G. L. (Univ. California Irvine, Sch. Medicine, Irvine, CA). *Arch. Surg.* 111(6):658-662; 1976.

Seven cases of duodenal ulcers caused by congenital anomalies are discussed. Over a 13-yr period in one hospital, there were two cases of congenital duodenal web, two cases of hypertrophic pyloric stenosis, two cases of annular pancreas, and one case of a preduodenal portal vein; a representative case study of each anomaly is presented. The first patient, a 50-yr-old man, had a sliding esophageal hiatal hernia without reflux, gastritis, gastric ulcer, and pyloroduodenal fistula. At surgery, an eccentric fenestrated duodenal membrane 2 cm distal to the pylorus, with a proximal posterior wall ulcer adjacent to the web, was found. Excision of the web, a truncal vagotomy, and a drainage procedure were necessary in both patients with webs. The second patient, a 51-yr-old man, had a perforated anterior pyloric channel ulcer with marked circumferential pyloric hypertrophy; a biopsy specimen revealed hypertrophic pyloric stenosis. Both patients with this anomaly had increased gastric acid secretion consistent with the previously reported observation that gastric outlet obstruction increases the hormonal phase of acid secretion. Treatment consisted of a Heineke-Mikulicz pyloroplasty and truncal vagotomy. In the third patient, a 45-yr-old man, an annular pancreas was found with a proximal 1-cm duodenal ulcer on the posterior wall of the bulb. Posterior gastrojejunostomy and truncal vagotomy were performed. The presence of a scarred duodenal bulb obscured the preoperative radiological diagnosis in both patients with this anomaly. The last patient, a 28-yr-old man, had endoscopic findings indicative of the Zollinger-Ellison syndrome (duodenal ulcer, gastritis, and duodenitis). At surgery, a preduodenal portal vein, associated malrotation of the gut, and a postbulbar duodenal ulcer were found. A gastroduodenostomy was performed anterior to the portal vein and a truncal vagotomy was performed. The authors conclude that in all cases of congenital obstruction and peptic ulcer disease, treatment should be directed toward relief of the obstruction and the reduction of basal acid secretion.

4910 GASTRIC ACID HYPERSECRETION IN CHILDREN WITH DUODENAL ULCER.

(Eng.) Christie, D. L.; Ament, M. E. (Children's Orthopedic Hosp. Medical Center, Seattle, WA). *Gastroenterology* 71(2):242-244; 1976.

Rates of gastric hydrochloric acid secretion were compared in 10 children with active duodenal ulcer and 14 children without ulcer. Duodenal ulcer was diagnosed by gastroduodenoscopy or by evidence of an ulcer crater on upper gastrointestinal radiographs. Duodenal ulcer disease was excluded in the comparison group by similar criteria. The mean basal acid output in the children with duodenal ulcer (3.2 mEq/hr or 0.064 mEq/kg/hr) was higher than in controls (1.3 mEq/hr or 0.248 mEq/kg/hr), but the difference was not statistically significant. Maximal acid output was significantly higher in the children with duodenal ulcer (21.6 mEq/hr or 0.486 mEq/kg/hr) than in the control group (10.4 mEq/hr, $p<0.025$ or 0.248 mEq/kg/hr, $p<0.005$). Peak acid output was also higher in the patients with duodenal ulcer (23.6 mEq/hr or 0.507 mEq/kg/hr) than in the control group (13.5 mEq/hr, $p<0.05$ or 0.332 mEq/kg/hr, $p<0.025$). These results demonstrate that, on the average, hypersecretion of gastric acid does occur in children with duodenal ulcer disease.

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4934 THE FUNCTIONAL STATE AND STRUCTURE OF THE GASTRIC MUCOSA IN PATIENTS WITH PEPTIC ULCER AFTER VAGOTOMY AND PYLOROPLASTY. (Rus.) Lytkin, M. I.; Orlov, A. V.; Rumyantsev, V. V. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Vestn. Khir.* 116(2):41-46; 1976.

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4937 CARCINOID TUMORS AND ULCERS OF THE GASTROINTESTINAL TRACT. REPORT OF ONE CASE. (Fre.) Gorin, J.-P.; Leger, L. (Hopital Cochin, 27, rue du Fg St-Jacques, F 75674 Paris Cedex 14, France). *Nouv. Presse Med.* 5(17):1135-1138; 1976.

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4940 THE PENETRATING DUODENAL ULCER: OPERATIVE TECHNIQUE AND POSTOPERATIVE COMPLICATIONS. (Ger.) Gebhardt, Ch.; Hoffman, E.; Moschinski, D. (Krankenhaus St. Josef, D-5600 Wuppertal 1, Bergstr. 6-12, W. Germany). *Langenbecks Arch. Chir.* 340(2):117-125; 1975.

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4942 HEMORRHAGING DUODENAL ULCER IN A HEMOPHILIAC. (Por.) Pereira, N. T.; Mendes de Almeida, J. M. (Hospital de Arroios, Lisbon, Portugal). *Bol. Clin. Hosp. Civis Lisb.* 35(1/4):275-283; 1973/1974.

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See also, 4654, 4753, 4756, 4822, 4823, 4858, 4965, 5111, 5212, 5267.

4945 RAPID LONG TUBE INTUBATION OF THE JEJUNUM BY A NEW ENDOSCOPIC DEVICE.

(Eng.) Johnson, F. W.; Goodale, R. L.; Leonard, A. S.; Varco, R. L. (Univ. Minnesota Health Sciences Center, Minneapolis, MN 55455). *Am. J. Surg.* 131(1):91-93; 1976.

The development of a special tube attachment adapted to a fiberoptic duodenoscope (Olympus Model GIF-K) has facilitated asceptic preoperative intubation of the small intestine for decompression of the obstructed loops, a procedure which had formerly been complicated by the difficulty in passing the tube through the pylorus. Under direct endoscopic vision, the tube can be carried into the second and third portion of the duodenum, released from the scope, and then further prodded into the jejunum. The procedure takes less than 15 min. Rapid intubation was easily carried out in five patients whose case reports are presented. Three patients had mechanical bowel obstruction. Rapid and effective decompression allowed adequate time for stabilization of concomitant problems, such as marked cardiopulmonary dysfunction secondary to a near fatal pulmonary embolus, severe peritonitis post appendectomy, and acidosis and dehydration. Surgical correction of the obstructing lesions was safely deferred for up to 1 week until the concomitant problems improved. The fourth patient, who was a renal transplant recipient, had chronic gastric ileus secondary to duodenal ulcer. Rapid passage of the long tube into the jejunum allowed restoration of nutrition and avoidance of gastrostomy. The fifth patient, with an ileus secondary to an infected abdominal aortic graft, underwent successful decompression, but died of sepsis. He was the only mortality. Jejunal intubation using this technique is rapid, relatively easy, and should encourage the wider acceptance of asceptic long tube intestinal decompression.

4946 MORPHOGENESIS OF DUODENAL ADENOCARCINOMAS INDUCED BY N-ETHYL-N'-NITRO-N-NITROSOGUANIDINE IN MICE AND RATS.

(Eng.) Matsuyama, M.; Nakamura, T.; Suzuki, H.; Nagayo, T. (Aichi Cancer Center Res. Inst., Kanokoden 81-1159, Chikusa-ku, Nagoya 464, Japan). *Gann Monogr. Cancer Res.* 17: 269-281; 1975.

The early morphological changes following the induction of duodenal adenocarcinomas by N-ethyl-N'-nitro-N-nitrosoguanidine (ENNG) were studied in CBA/H-T6 mice and Wistar rats. The results of previously reported studies on the induction of duodenal adenocarcinomas by ENNG and N-methyl-N'-nitro-N-nitrosoguanidine and on the ultrastructure of the early lesions are reviewed. In the present study, one group of mice were given ENNG (500 mg/l) in the drinking water for 4, 8, or 12 weeks. The mice were killed after 8 more weeks of treatment with plain water. Two types of initial morphological changes were seen to be involved in the development of lesions after 12 weeks of treatment: enlargement of a single villus and fusion of several villi. In the first type, atypical glands occupied the whole lamina propria as blind cysts without transitional communication with the covering epithelium; in the second type, several atypical glands were situated in the lamina propria of the fused villi. The intravillous lesions proliferated upward and laterally, and eroded the surface of the villi (crater-form lesions). The latter increased in size and developed into macroscopic lesions. This sequence of morphological events was confirmed by counting the number of each of the three lesions at various time intervals; the number of the intravillous lesions decreased, and the number of crater-form and macroscopic lesions increased as the treatment progressed. Mice given 50 mg/l ENNG for 48 weeks had about half the number of intravillous and crater-form lesions, but twice the number of macroscopic lesions as the mice given 500 mg/l for 4 weeks. Similar morphological changes were observed in Wistar rats given 500 mg/l of ENNG for 20 weeks. No duodenal erosions or ulcers occurred in mice given 500 mg/l of ENNG for 1, 3, 7, or 28 days. The systematic examination of serial sections of the intravillous lesions revealed that the surface cells of the villi and crypts were normal. Transitions from normal to abnormal were not observed, suggesting that neoplastic changes occur in the middle proliferating zones of the crypts, penetrating directly into the lamina propria of the villi. The results suggest that the ENNG carcinogenesis in the duodenum occurs in a single step.

4947 RESURGENCE OF TWO FETAL ALDOLASES IN RAT DUODENAL ADENOCARCINOMAS.

(Eng.) Banroques, J.; Martin, M. S.; Martin, F.; Hatzfeld, A.; Schapira, F. (Institut de Pathologie Moleculaire, 24, rue du faubourg Saint-Jacques, 75014 Paris, France). *Biomedicine* 23(9):382-386; 1975.

Kinetic, electrophoretic, and immunological studies were carried out in well-differentiated rat adenocarcinomas to determine the activities of fetal aldolases. Small intestinal carcinomas were induced in Lewis rats by N-methyl-N'-nitro-N-nitrosoguanidine. Original tumors were transferred into syngeneic animals by i.m. injection of a tumor cell suspension. The resulting passages of solid tumors were grown as s.c. grafts into the anterior wall of the thorax. The aldolase content of these tissues was compared with that in normal and fetal (day 15-21 of gestation) intestinal tissues from Wistar rats. The mean aldolase activity ratio of fructose-1-6-diphosphate to fructose-1-phosphate (FDP/FIP) in normal adult rats was 1.33, corresponding to the presence of aldolase B with a small amount of aldolase A. The aldolase activity ratio of normal Lewis rats was identical (1.3). In contrast, the ratio in the fetal intestine was 19.0 at the 15th gestational day, which progressively decreased, reaching 1.4 at birth. Electrophoretic studies confirmed that the aldolase of adult intestine was almost exclusively aldolase B (a strong cathodic band of B4 with an hybrid A.B). In both 16-day fetal intestine and in adenocarcinoma, the electrophoretic pattern showed several anodic bands, demonstrating that two types of aldolase, A and C, hybridize together in these tissues. Using the Ouchterlony method, no precipitation line was found between antiserum anti-aldolase B and an extract of adenocarcinoma. In contrast, a precipitation line was found between antiserum anti-aldolase C and a tumor extract, confirming the abnormal presence of aldolase C in these adenocarcinomas. This study demonstrates the resurgence of both fetal aldolases A and C in adenocarcinomas of mucosal origin.

4948 SMALL BOWEL MUCOSAL DYSFUNCTION IN PATIENTS WITH CYSTIC FIBROSIS. (Eng.) Morin, C. L.; Roy, C. C.; Lasalle, R.; Bonin, A. (Sainte Justine Hosp., 3175 St. Catherine Rd., Montreal H3T 1C5, P. Q., Canada). *J. Pediatr.* 88(2):213-216; 1976.

Disaccharidase activity, L-ananyl-L-phenylalanine (L-ALA-L-Phe) hydrolase activity, and intestinal uptake of three ^{14}C-labeled amino acids were measured in jejunal biopsies from 37 children with cystic fibrosis (CF), 16 children with untreated gluten-induced enteropathy, and 18 control subjects. Lactase, sucrase, and maltase activities, and L-ALA-L-Phe hydrolase activity, were significantly reduced ($p<0.01$) in CF patients (2.4, 10.3, and 30.5 U/g mucosa and 29.1 U/mg mucosal protein, resp.) compared to control subjects (4.0, 10.1, and 34.1 U/g and 29.1 U/mg, resp.). Definite hypolactasia was also observed in 23% of the children with CF. Lysine uptake was normal in CF patients, whereas uptake of 0.01 mM phenylalanine and 0.5 mM cycloleucine was reduced (distribution ratio, 25.5 and 6.6 mM, resp.) compared to controls (38.7 and 9.8 mM, resp.). Disaccharidase activity, L-ALA-L-Phe hydrolase activity, and amino acid uptake were all significantly reduced in patients with gluten-induced enteropathy. This study suggests the presence of an intestinal component to the malabsorption of patients with CF.

4949 TREATMENT OF POSTOPERATIVE REACTIVE HYPOGLYCEMIA BY A REVERSED INTESTINAL SEGMENT. (Eng.) Fink, W. J.; Hucke, S. T.; Gray, T. W.; Thompson, B. W.; Read, R. C. (Veterans Admin. Hosp., Fayetteville, AR 72701). *Am. J. Surg.* 131(1):19-22; 1976.

The value of using reversed (antiperistaltic) intestinal segments as a treatment for postoperative reactive hypoglycemia was studied in 11 men who developed the dumping syndrome and late phase with disabling reactive hypoglycemia (range, 12-50 mg/100 ml). Five patients underwent 50-75% Billroth II gastrectomy, one of whom also underwent vagotomy. Three patients had 50-75% Billroth I gastrectomy, one of whom also had a vagotomy. Three patients underwent vagotomy and pyloroplasty. The patients were treated an average of 7 yr after gastric surgery with a 10-cm reversed jejunal segment. The reversal was placed at the gastric outlet in six patients and just below the ligament of Treitz in five. The former technique produced a somewhat better correction of hypoglycemia than did the latter. A good result was obtained in all patients, and none has had recurrence of seizures or fainting. Whereas the average minimal blood sugar before reversal was 34 mg/100 ml, after reversal it was increased to 64 mg/100 ml. The most severe hypoglycemia was noted in a patient after vagotomy and pyloroplasty. The authors recommend that all patients with dumping syndrome undergo glucose tolerance tests and plasma insulin determinations to ascertain whether they have reactive hypoglycemia. A reversed jejunal segment can control refractory reactive hypoglycemia resulting from previous gastric surgery.

4950 THE EXCLUDED SMALL-BOWEL SEGMENT: A SOURCE OF COMPLICATIONS AFTER SMALL-BOWEL BYPASS. (Eng.) Harmon, J. W.; Aliapoulos, M.; Braasch, J. W. (Walter Reed Army Medical Center, Washington, DC). *Arch. Surg.* 111(9):953-954; 1976.

Two cases of obstruction of the bypassed small intestine after jejunoileal shunt for obesity are presented. The first patient, a 39-yr-old woman, experienced abdominal pain 17 months after the bypass operation. At laparotomy, 500 ml of free abdominal fluid were aspirated, and a loop of excluded small intestine that was obstructed and viable was found to have herniated through a mesenteric defect. The second patient, a 27-yr-old man, developed abdominal pain 8 months after bypass. At laparotomy, many loops of tensely distended small intestine were seen. Aspiration yielded 3,000 ml of fluid. A 360-degree volvulus of a portion of the excluded loop around the anastomosis of the small intestine to the sigmoid was discovered. The volvulized segment was resected, the sigmoid colon was closed, and the distal end of the remaining excluded loop was brought out as a mucocutaneous fistula. Several mesenteric defects were closed. Two months later, the fistula was disconnected, and the bypassed bowel was anastomosed to the cecum. Difficulty in evaluating an acute abdomen after a patient has undergone bypass stems from residual obesity and from the fact that the bypassed intestine is removed from the fecal stream and may not be visualized on the roentgenogram, despite obstruction (as in the first patient). The upright abdominal roentgenogram of the second patient showed air fluid levels, presumably formed by enteric bacteria. The prevention of bypassed bowel obstruction involves the closure of all mesenteric defects at the original operation.

4951 BYPASS ENTERITIS: A NEW COMPLICATION OF JEJUNOILEAL BYPASS FOR OBESITY. (Eng.) Passaro, E., Jr.; Drenick, E.; Wilson, S. E. (Veterans Admin. Hosp. Center, Los Angeles, CA 90073). *Am. J. Surg.* 131(2):169-174; 1976.

Case reports of four patients who underwent jejuno-ileal bypass for obesity and who subsequently developed bypass enteritis are presented. The operation in each instance was end-to-end anastomosis of 12 inches of proximal jejunum to 6 inches of distal ileum. The bypassed segment of the small bowel was drained by ileosigmoidostomy. Bypass enteritis consisted of a sudden onset of abdominal distension and tenderness, increased frequency of diarrhea, and fever of up to 104 F. Abdominal x-rays showed air-filled, dilated small bowel loops without fluid levels. In two patients, pneumatosis cystoides intestinalis was noted, and in one patient, the presence of free intra-abdominal air was noted. Initially, the patients were thought to have intra-abdominal infection. Two of these patients underwent operation for suspected peritonitis from abscess or obstruction, neither of which was found. The bypassed bowel contained many subserosal gas-filled blebs. The other two patients were treated with antibiotics and showed prompt improvement. It is concluded that bypass enteritis must be considered in the postoperative period in patients undergoing surgery for morbid obesity. It responds to antibiotics and appropriate electrolyte therapy. The presumed factor is overgrowth of enteric bacteria in the distal portion of the bypassed bowel. Accurate diagnosis will obviate the need for surgical exploration to exclude peritonitis.

4952 FATAL EOSINOPHILIC ENTERITIS. (Eng.) Tytgat, G. N.; Grijm, R.; Dekker, W.; den Hartog, N. A. (Wilhelmina Gasthuis, Div. Gastroenterology, le Helmersstraat 104, Amsterdam, Netherlands). *Gastroenterology* 71(3):479-483; 1976.

The case of a 66-yr-old man with fatal eosinophilic enteritis of the jejunum is reported. The patient presented with anorexia, vomiting, mild constipation, and a firm periumbilical mass. X-ray examination of the small intestine using the enteroclysis technique revealed two areas of marked irregularity and narrowing. At laparotomy, a huge, firm inflammatory mass involving the proximal 60 cm of jejunum was found. The bowel loops were inflamed, firmly adhering to each other, and covered by a thick layer of fibrinous exudate. The diagnosis was made after pathological examination revealed that the whole thickness of the bowel wall was infiltrated by a dense infiltrate consisting of granulation tissue, lymphocytes, plasmocytes, and numerous mature-looking eosinophils. The eosinophilic infiltration eroded the overlying mucosa, producing acute superficial ulceration. Serological testing for toxoplasmosis, anisakiasis, toxocariasis, ascariasis, trichinosis, and other parasitic diseases was negative. The patient developed bacterial overgrowth in the proximal small bowel. Treatment with prednisone (15 or 30 mg/day), parenteral nutrition, elemental diet, and antimicrobials failed to control the disease or bacterial overgrowth. Surgical resection was impossible because of the extent of the disease. Despite a temporary improvement with high steroid doses (100 mg prednisone/day, i.v.) and total parenteral nutrition, the patient died in cachexia after resumed p.o. feeding. The authors speculate on whether the disease might fit into the spectrum of the usually fatal disseminated eosinophilic collagen disease, also called hypereosinophilic syndrome, although several findings in this patient do not support this possibility.

4953 PEPTIDE TREATMENT OF POSTGASTRECTOMY OBSTRUCTION. (Eng.) Hiatt, R. B.; Goodman, I. (161 Fort Washington Ave., New York, NY 10032). *Arch. Surg.* 111(9):997-999; 1976.

The effect of coherin, a peptide isolated from the bovine neurohypophysis, in the treatment of life-threatening postgastrectomy obstruction was tested in 17 patients. Acute or chronic postgastrectomy obstruction occurred after Billroth II partial gastrectomy for ulcer (11 patients), Billroth I partial gastrectomy for ulcer (1), vagotomy and pyloroplasty for ulcer (1), gastrojejunostomy with vagotomy for ulcer (2), take-down of gastrojejunostomy-jejunal reflux (1), and esophagogastrectomy for carcinoma (1). On an average of 38 days after surgery, the patients received 100 μg of coherin, s.c., every 12 hr. Ten patients had acute physiological obstruction for an average of 38.6 days before coherin therapy, five had chronic obstruction with severe malnutrition for an average of 25 months before treatment, and two patients had chronic obstruction without severe malnutrition for an average of 5 months before treatment. In all 17 patients, the obstructive symptoms were relieved after the institution of coherin therapy, and the nasogastric tube could be permanently removed 4 days after treatment was begun. The patients with chronic obstruction and malnutrition required prolonged coherin therapy for continued, adequate p.o. alimentation. Three of these patients required coherin intermittently for an average of 2 yr; in two patients, coherin was required twice daily to prevent the symptoms of obstruction from returning. Coherin appears to be effective in the treatment of postgastrectomy obstruction.

4954 COLONIC INFUSION IN THE MANAGEMENT OF THE SHORT BOWEL SYNDROME. (Eng.) Rodgers, J. B.; Bernard, H. R.; Balint, J. A. (Albany Medical Coll., Albany, NY 12208). *Gastroenterology* 70(2):186-189; 1976.

The cases of two patients in whom colonic fluid infusion was used in the treatment of fluid and electrolyte imbalance, which resulted from the short bowel syndrome are presented. The first patient, a 44-yr-old woman, had initially undergone an end-to-side ileocolostomy for the treatment of regional ileitis. Eleven years later, she experienced severe diarrhea. At operation, the terminal 6 inches of residual small bowel were found to be grossly abnormal; the entire visualized colon was inflamed. The small bowel was divided just proximal to the area of gross involvement, and an ileostomy was fashioned. The end of the distal segment of ileum was brought to the anterior abdominal wall as a mucous fistula. During the next 2 postoperative months, the patient required continuous i.v. fluids and electrolyte replacement. After this period, the ileostomy outputs stabilized at 2-3 l/day, and the patient was gradually removed from i.v. therapy. Repeated episodes of fluid and electrolyte imbalance led to an attempt to supplement fluids by infusing saline (9 g NaCl and 4 g KCl/l tap water) into the colon via the mucous fistula. The patient has been able to administer this solution by herself, and has been able to tolerate infusions of 1.5 liters/24 hr in divided doses. She has remained in good fluid and electrolyte balance with normal renal function for the past 14 months. The second patient, a 39-yr-old man, had undergone resection of most of the small bowel for the treatment of bowel infarction resulting from a strangulated diaphragmatic hernia; the transverse colon

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had also been resected, and a right-sided colostomy had been constructed. The descending colon was vented with a mucous fistula. The postoperative management was complicated by the development of an enterocutaneous fistula, which drained 2-5 l/day, plus sepsis, renal failure, bleeding from gastric ulcers, and jaundice resulting from gallstones. The enterocutaneous fistula was closed, a cholecystectomy was performed, and the patient's symptoms resolved, with the exception of a fluid and electrolyte imbalance resulting from large fluid losses from the colostomy. The descending colon was infused with fluids (400 ml dextrose and saline) via the mucous fistula for 2 weeks, and the patient improved; the colostomy was subsequently closed successfully. It appears that colonic fluid infusion is useful in the management of patients with the short bowel syndrome. A simple diverting ileostomy seems preferable to colectomy in the surgical treatment for Crohn's disease.

4955 ENZYMOLOGY OF THE SMALL INTESTINAL MUCOSA. (Ger.) Lorenz-Meyer, H.; Riecken, E. O. (Medizinische Klinik, Universitat Marburg, 355 Marburg, Mannkopfstrasse 1, W. Germany). *Med. Klin.* 71(1):7-17; 1976.

4956 DIAGNOSTIC PROBLEMS OF ACUTE INTESTINAL BLEEDING FROM SMALL INTESTINAL TUMORS AND FROM MECKEL's DIVERTICULUM. (Ger.) Gronniger, J.; Seitz, W. (No affiliation given). *Z. Gastroenterol.* 14:260; 1976.

4957 DIFFERENTIAL DIAGNOSIS AND SURGICAL TREATMENT OF FAMILIAL INTESTINAL POLYPOSIS. (Ger.) Ulrich, B.; Moschinski, D.; Becker, H. J.; Rumpf, P.; Jacobs, G. (Chirurgische Universitatsklinik Dusseldorf, D-4000 Dusseldorf, Moorenstr. 5, W. Germany). *Langenbecks Arch. Chir.* 340(2):137-146; 1975.

4958 DIRECT CHANGES IN DUODENAL PAPILLA AND CHOLANGIOGRAPHY RESULTS IN PATIENTS AFTER SPHINCTEROTOMY. (Pol.) Poltorak, J. L. (01-640 Warszawa. ul Paska 9, Poland). *Przegl. Lek.* 32(3): 329-335; 1975.

4959 RADIOLOGICAL RESULTS AFTER PAPILLA OPERATIONS. (Ger.) Moldenhauer, W.; Herzog, K. H.; Kroger, W.; Pietsch, P.; Sewcz, H.-G. (Radiologische Klinik, DDR-25 Rostock, Ernst-Heydemann-Strasse, Germany). *Radiol. Diagn. (Berl.)* 16(3): 333-338; 1975.

4960 INFLUENCE OF SHUNT AND RESECTION OF THE SMALL INTESTINE ON THE GASTRIN SECRETION. (Ger.) Hausamen, T. U.; Wedell, J.; Fritsch, W.-P. (No affiliation given). *Z. Gastroenterol.* 14:229-230; 1976.

4961 A COMPARATIVE EVALUATION OF THE SURGICAL TREATMENT METHODS DEALING WITH BENIGN STENOSIS OF THE MAJOR DUODENAL PAPILLA--VIEWED IN THE LIGHT OF RECENT RESULTS. (Rus.) Kozlov, I. Z.; Grach, Z. Ya.; Volkov, V. S. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (2):128-132; 1976.

4962 SURGERY IN PATHOLOGICAL OBESITY: JEJUNO-ILEOSTOMY. (Spa.) Casal, M. A.; Lamm, A. E. (Policlinico Ciudadela, Provincia de Buenos Aires, Argentina). *Prensa Med. Argent.* 62(8):188-192; 1975.

4963 JEJUNOSTOMY AFTER TOTAL GASTRECTOMY. (Fre.) d'Ambrosio, G. (Ospedale Generale Regionale, S. Maria del Battuti, S. M. Ca Foncello, 31100 Treviso, Italy). *Acta Chir. Belg.* 74(4):377-381; 1975.

4964 DUODENAL COMPLICATIONS FOLLOWING DIFFICULT NEPHRECTOMY. (Fre.) Vincent, E. (No affiliation given). *J. Urol. Nephrol. (Paris)* 81(10/11):857-863; 1975.

4965 EFFECT OF ANTIBIOTICS ON THE ASSIMILATION OF EXOGENOUS VITAMIN B_{12} AND IRON IN PATIENTS WITH AFFERENT LOOP SYNDROME. (Rus.) Govorovich, E. A.; Elagina, L. V.; Bulgakov, G. A. (A. V. Vishnevskii Inst. Surgery, USSR Acad. Medical Sciences, Moscow, USSR). *Klin. Med. (Mosk.)* 53(10):75-78; 1975.

4966 SMALL INTESTINAL DYSFUNCTION ASSOCIATED WITH HIVES AND OTHER DERMATOSES. (Ger.) Heise, H.; Mattheus, A. (Universitats-Hautklinik, DDR-25 Rostock, Augustenstr. 80, E. Germany). *Dermatol. Monatsschr.* 161(9):729-734; 1975.

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4968 AORTIC LESION RUPTURE WITH PROFUSE HEMORRHAGE INTO THE DIGESTIVE TRACT. (Rus.) Soinov, N. N.; Krivtsun, V. A. (Tiraspol Hosp., Moldavian SSR, Tiraspol, USSR). *Vestn. Khir.* 115 (11):19-23; 1975.

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4970 DUODENAL SCHWANNOSARCOMA WITH HEPATIC METASTASES TREATED SIMULTANEOUSLY WITH DUODENECTOMY, PARTIAL PANCREATECTOMY AND RIGHT HEPATECTOMY. (Fre.) Rignault, D.; Pailler, J.-L.; Pagliano, G.; Brun, J.-G. (Service de Chirurgie Viscerale et Vasculaire, H.I.A. Begin, 94160 Saint-Mande, France). *Chirurgie* 101(5):316-320; 1975.

4971 MULTILOCULAR TUMORS OF SMALL INTESTINE. (Ger.) Fuchs, H. F.; Westhoff, D.; Stein, P.; Sturm, G. (Medizinische Klinik mit Poliklinik, Universitat Erlangen-Nurnberg, D-8520 Erlangen, Krankenhausstrasse 12, W. Germany). *Radiologe* 15(9):364-369; 1975.

4972 FUNCTIONAL STATE OF THE DUODENUM IN CHRONIC DUODENITIS. (Rus.) Serebrina, L. A.; Mavrodiy, V. M. (Odessa Scientific Res. Inst. Balneology, Odessa, USSR). *Vrach. Delo* (2):39-42; 1976.

4973 ON THE PHENOMENON OF LEUKERGY IN CHRONIC ENTEROCOLITIS. (Rus.) Sil'chenko, T. S. (Dnepropetrovsk Scientific Res. Inst. Gastroenterology, Dnepropetrovsk, USSR). *Vrach. Delo.* (11):63-67; 1975.

4974 ROENTGENOLOGICAL CHANGES IN THE SMALL INTESTINE IN CHILDREN WITH LYMPHOGRANULOMATOSIS. (Rus.) Pereslegin, I. A.; Tsyplenkov, V. G.; Granovskaya, F. M. (Moscow Scientific Res. Inst. Radiology, Russian SSR Ministry Health, Moscow, USSR). *Vestn. Rentgenol. Radiol.* (5):36-42; 1975.

4975 INTRAMURAL GAS COLLECTION IN THE SMALL BOWEL. (Ger.) Bottcher, J.; Bosse, U.; Grosse-Wilde, E. (Leitender Arzt Rontgenabteilung am Kreiskrankenhaus, D-3057 Neustadt, W. Germany). *Radiologe* 15(9):370-372; 1975.

4976 INTESTINAL LYMPHANGIECTASIS: MORPHOLOGICAL FINDINGS AND THERAPEUTIC CONSEQUENCES. (Ger.) Rottger, P.; Bender, S. W.; Strobel, S.; Klempa, J. (No affiliation given). *Z. Gastroenterol.* 14:261; 1976.

4977 A RARE FORM OF NEONATAL OBSTRUCTION AS A RESULT OF SEGMENTAL DILATATION OF THE SMALL INTESTINE. (Fre.) Wallon, P.; Mitrofanoff, P.; Borde, J. (Clinique Chirurgicale Infantile, 76000 Rouen, France). *Ann. Chir. Infant (Paris)* 16(3):181-188; 1975.

4978 EOSINIPHILIC PHLEGMON OF THE SMALL INTESTINE DUE TO Eustoma rotundatum. (Dut.) Rutgeerts, L.; de Coster, M.; Tytgat, G.; Tanghe, W. (Sint Jozefskliniek Izegem B 8700 Izegem, Belgium). *Tijdschr. Gastroenterol.* 18(2):113-118; 1975.

4979 BACTERIAL OVERGROWTH IN THE SMALL INTESTINE: ITS CAUSES AND CONSEQUENCES. (Dut.) Huibregtse, K.; den Hartog Jager, F. C. A.; Tytgat, G. N. J. (Wilhelmina Gasthuis, Amsterdam, Netherlands). *Tijdschr. Gastroenterol.* 18(2):71-84; 1975.

See also, 4587, 4643, 4718, 4728, 4771, 4772, 4776, 4777, 4778, 4864, 4872, 4876, 4885, 4888, 4906, 5069, 5232, 5290, 5295, 5304, 5328, 5341, 5356.

SMALL INTESTINE

Malabsorption

4980 A COMPARISON OF HISTOCOMPATIBILITY ANTIGENS IN DERMATITIS HERPETIFORMIS AND ADULT COELIAC DISEASE. (Eng.) Seah, P. P.; Fry, L; Kearney, J. W.; Campbell, E.; Mowbray, J. F.; Stewart, J. S.; Hoffbrand, A. V. (St. Mary's Hosp., London W2 1NY, England). *Br. J. Dermatol.* 94(2):131-138; 1976.

Immunological processes in both dermatitis herpetiformis (DH) and adult celiac disease (ACD) were investigated, and the theory that DH patients can be divided according to the presence or absence of a macroscopic gut lesion plus an increased incidence of histocompatibility antigen, HL-A 8, was tested. The incidence of HL-A, 4a and 4b, was studied in 38 patients with DH, 36 patients with ACD, and 180 normal controls. The 4b antigen was found in all the DH and ACD patients. HL-A 8 was found in 89% of patients with ACD and in 79% of patients with DH. There was no significant difference in the incidence of HL-A 8 between those patients with DH whose small intestinal biopsies appeared macroscopically abnormal and those with a normal macroscopic appearance. These findings suggest that patients with DH form a single disease group. They do not support the previously postulated concept that there are two groups of patients with DH, one with an increased incidence of HL-A 8 antigen simi-

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lar to that in ACD with a gluten-sensitive enteropathy, and another with a normal incidence of HL-A 8 antigen and without enteropathy.

4981 SERUM LYSOZYME IN INFLAMMATORY BOWEL AND COELIAC DISEASE. (Eng.) Mallas, E.; Terry, J. M.; Asquith, P.; Cooke, W. T. (The General Hosp., Birmingham, England). *J. Clin. Pathol.* 29(7): 598-600; 1976.

The claims that serum lysozyme activity differentiates between Crohn's disease and ulcerative colitis and that serum lysozyme levels may serve as an index of disease activity were evaluated. Serum lysozyme levels were determined by a turbidometric method using egg white lysozyme in 100 patients with Crohn's disease, 86 with ulcerative colitis, 31 with celiac disease, and 38 normal controls. Although the levels in Crohn's disease (17.2 μg/ml) were significantly higher than those in ulcerative colitis (13.3 μg/ml, $p<0.001$), adult celiac disease (14.6 μg/ml, $p<0.025$), and controls (11.5 μg/ml, $p<0.001$), there was marked overlap between the diseased and control subjects. There were significant correlations ($p<0.001$) in both Crohn's disease and ulcerative colitis between seromucoids and albumin, albumin and hemoglobin, and seromucoids and hemoglobin. Lysozyme values correlated significantly with serum seromucoid levels ($p<0.001$) in Crohn's disease, but did not correlate in ulcerative colitis; lysozyme did not correlate with albumin or hemoglobin in either disease. It is concluded that serum lysozyme determinations are not useful in the differential diagnosis between Crohn's disease and ulcerative colitis, but that they may be valuable in assessing disease activity in Crohn's disease.

4982 RELATIONSHIP BETWEEN DISTURBANCE OF MICELLAR FORMATION AND STEATORRHEA. (Eng.) Ishikawa, M.; Masamune, O.; Yamada, H.; Takahashi, T.; Matsuura, S.; Torihata, K.; Gonai, T.; Nagasaki, A.; Tsuboi, M.; Yamagata, S. (Yamagata Univ. Sch. Medicine Yamagata, Japan). *Tohoku J. Exp. Med.* 118(Suppl.): 85-88; 1976.

Studies were carried out in 12 healthy subjects and 20 patients with steatorrhea to determine whether steatorrhea is caused by the impairment of micelle formation. Steatorrhea was associated with the malabsorption syndrome caused by chronic pancreatitis, pancreatectomy, gastrectomy, or ileal diseases, each in five patients. After each patient had ingested a test meal consisting of 30 g of corn oil, 60 g of skimmed milk, 60 g of glucose, and 400 ml of water, the jejunal contents were collected by intubation. The micellar phase was composed of 70.3 ± 15.8% and 62.6 ± 9.5% fatty acid in the controls and patients, resp. Monoglyceride accounted for 19.0 ± 10.0% and 21.9 ± 7.7% of the micellar phase in controls and patients, resp., while the micellar di- and triglyceride contents were much less (10.4 ± 8.7% and 15.5 ± 8.2%, resp.). The mean value of the ratio of fat content in the micellar phase to the total fat content was 76.9 ± 21.5% in 38 normal subjects. In contrast, the micellar fat ratio was decreased in the patients with malabsorption to 56.1 ± 20.3% in pancreatitis, 24.9 ± 20.8% in pancreatectomy, 50.0 ± 21.8% in gastrectomy, and 45.1 ± 14.2% in ileal disease. When values for micellar fat were plotted against those for fecal fat excretion in patients and controls, the percentage of fat in the micellar phase decreased as the fecal fat excretion increased ($r= 0.524$). The results indicate that the impairment of micelle formation causes a disturbance in intraluminal fat digestion, resulting in steatorrhea.

4983 INTESTINAL PERFUSION STUDIES IN TROPICAL SPRUE. 1. AMINO ACID AND DIPEPTIDE ABSORPTION. (Eng.) Hellier, M. D.; Radhakrishnan, A. N.; Ganapathy, V.; Mathan, V. I.; Baker, S. J. (Christian Medical Coll. Hosp., Vellore-632004, Tamil Nadu, India). *Gut* 17(7):511-516; 1976.

Intestinal absorption of glycine (20 μM), glycyl-glycine (10 μM) plus L-leucine (10 μM), and glycyl-L-leucine (10 μM) was studied by intestinal perfusion in 11 patients with tropical sprue and 10 age- and sex-matched controls. The patients with sprue had a significant reduction in the rate of absorption of glycine from a 20 μM solution, but there were no significant differences in the absorption of the other substances. The failure to demonstrate any difference in absorption is probably related to the low concentration of the substances relative to the maximum absorptive capacity of the intestine. The kinetic advantage of glycylglycine absorption compared with glycine absorption was maintained in the patients with sprue and the controls. The mean kinetic advantage for glycine from the dipeptide solution was 30% in controls and 34.5% in the patients with sprue. When the dipeptides were perfused, free amino acids appeared in the perfusate, presumably by back diffusion from the mucosal cells. In the case of glycyl-L-leucine, considerably more glycine and leucine were found in the perfusate in patients with sprue than in the control subjects. There was no correlation between peptide absorption and the concentration of total glycylglycine hydrolase and glycyl-L-leucine hydrolase, measured as combined brush border and cytosol enzymes. The concentrations of these enzymes were similar in both groups of subjects.

4984 WHIPPLE'S DISEASE: DEMONSTRATION BY IMMUNOFLUORESCENCE OF SIMILAR BACTERIAL ANTIGENS IN MACROPHAGES FROM THREE CASES. (Eng.) Keren, D. F.; Weisburger, W. R.; Yardley, J. H.; Salyer, W. R.; Arthur, R. R.; Charache, P. (Walter Reed Army Inst. Res., Washington, DC 20012). *Johns Hopkins Med. J.* 139(2):51-59; 1976.

The etiology of Whipple's disease was investigated in three patients by an immunofluorescence technique that can localize and help characterize bacterial antigens in tissue. Jejunal tissue specimens from the three patients with the disease, from three normal subjects, and from one patient with celiac-like disease were exposed to rabbit antibacterial grouping sera and then to fluorescein-conjugated antirabbit immunoglobulin g (IgG). Bacterial antigens were detected in the granules of the foamy macrophages from all patients with Whipple's disease. The macrophages in each case stained with several types of antibacterial grouping sera. Jejunal biopsies from the normal subjects and from the patient with celiac-like disease did not show significant reactions to any of the antisera. When these same antisera were reacted with homologous and heterologous bacteria, numerous cross-reactions were seen. However, each organism only reacted with certain antisera, resulting in a distinctive pattern of reaction that could identify it. If a different organism was present in each case of Whipple's disease, the antisera should give dissimilar reactions from case to case, but if the same type of microbe was present in each case, a similar pattern of reaction should be seen. In this study, the reactions were remarkably similar from case to case. These results suggest that a single, antigenically definable microorganism is present in the jejunal tissue of patients with Whipple's disease.

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4985 IMPORTANCE OF DIETETIC THERAPY IN MALABSORPTION SYNDROMES. (Ita.) Vannini, P.; Gandolfi, L.; Gasbarrini, G.; Miglio, F.; Rossi, A.; Costa C. Corazza, G. R. (Istituto di Clinica Medica Generale, Universita di Bologna, Bologna, Italy). *Arch. Ital. Mal. Appar. Dig.* 37(3):173-184; 1975.

4986 MALABSORPTION OF CARBOHYDRATES IN CHILDREN. (Spa.) Vazquez, C.; Escobar, H.; Polanco, I.; Codoceo, R.; Vitoria, J. C. (Clinica Infantil "La Paz," Universidad Autonoma, Madrid, Spain). *An. Esp. Pediatr.* 8(2): 105-194; 1975.

4987 LACTOSE MALABSORPTION IN IMMIGRANT WORKERS. (Dan.) Gudmand-Hoyer, E.; Busk, H. E. (Medicinsk afdeling B, Kobenhavns amt sygehus i Gentofte, DK-2900 Hellerup, Denmark). *Ugeskr. Laeger* 137(28):1584-1585; 1975.

4988 ACRODERMATITIS ENTEROPATHICA--A DISTURBANCE OF ZINC METABOLISM WITH ZINC MALABSORPTION. (Ger.) Lombeck, I.; Schnippering, H. G.; Kasperek, K.; Ritzl, F.; Kastner, H.; Feinendegen, L. E.; Bremer, H. J. (Medizinische Einrichtungen, Universitat Dusseldorf, D-4000 Dusseldorf, Morrenstrasse 5, W. Germany). *Z. Kinderheilkd.* 120(3): 181-189; 1975.

4989 IMMUNOLOGIC DEFICIENCY ASSESSED BY SKIN TESTS IN MALABSORPTION SYNDROMES OF VARIOUS ETIOLOGIES. (Por.) Laudanna, A. A.; Mendes, E.; Sipahi, A.; Pinto de Moraes Filho, J. P.; Bettarello, A. (Clinica Medica, Univ. Sao Paulo, Sao Paulo, Brazil). *Rev. Hosp. Clin. Fac. Med. Sao Paulo* 30(Suppl. 4):294-297; 1975.

4990 CELIAC DISEASE OF THE ADULT: REPORT OF ONE CASE DIAGNOSED FROM HEPATIC STEATOSIS AND AUTOIMMUNE HEMOLYTIC ANEMIA. (Fre.) Puchelle, J. C.; Lederlin, P.; Rauber, G.; Thibaut, G.; Witz, F.; Aymard, J. P. (No affiliation given). *Ann. Med. Nancy* 15:41-44, 47; 1976.

4991 GLUTEN-FREE DIET AND COURSE OF ADULT CELIAC DISEASE. (Fre.) Cerf, M.; Marche, C.; Fremont, A.; Eugene, C.; Paolaggi, J.-A.; Leymarios, J.; Couturier, D.; Debray, C. (Hopital Bichat, 170, boulevard Ney, F 75877 Paris, Cedex 18, France). *Arch. Fr. Mal. App. Dig.* 64(6):483-493; 1975.

4992 SERUM CORTISOL IN SEVERE PROTEIN-ENERGY MALNUTRITION. (Spa.) Frenk, S.; Luengas, J.; Junico, E. (Departemento de Investigacion Clinica, Av. Cuauhtemoc 330, Mexico 7, D.F.). *Arch. Invest Med. (Mex.)* 6(2):397-402; 1975.

4993 STERIC STRUCTURE OF THE SMALL INTESTINAL MUCOSA IN NORMAL SUBJECTS, AND SPRUE-TYPE TRANSFORMATION PROCESSES. (Ger.) Riecken, E. O.; Sahlfeld, M.; Lorenz-Meyer, H. (No affiliation given). *Z. Gastroenterol.* 14:254; 1976.

4994 PORTAL HYPERTENSION AND INTESTINAL MALABSORPTION FOLLOWING PORTAL THROMBOSIS DUE TO UMBILICAL CATHETERIZATION. (Spa.) Brines, J.; Escribano, A.; Almenar, L.; Aparisi, L.; Barbera, V.; Colomer, J. (Hospital Clinico, Valencia, Spain). *Rev. Esp. Pediatr.* 31(183):391-406; 1975.

See also, 4587, 4758, 4760, 4821, 4948, 4976, 4979, 5124, 5309, 5336.

LARGE INTESTINE

4995 DOES BACTEREMIA FOLLOW COLONOSCOPY? (Eng.) Norfleet, R. G.; Mulholland, D. D.; Mitchell, P. D.; Philo, J.; Walters, E. W. (Marshfield Clinic, 1000 North Oak Ave., Marshfield, WI 54449). *Gastroenterology* 70(1):20-21; 1976.

To determine the risk of bacteremia from colonoscopy, blood specimens from 40 patients were cultured the day before laxative and enema preparation; right after such preparation; and 15 min, 1 hr, and 4 hr after colonoscopy. Bacteremia was not induced by either the preparation or the colonoscopy, which, in 27 patients, included polypectomy, biopsy, and/or fulgurations. It is concluded that the risk of bacteremia following colonoscopy is small, and antibiotic prophylaxis for patients with susceptible hearts is probably not needed.

4996 EFFECTS OF PROPHYLACTIC ANTIBIOTICS ON COLONIC HEALING.

(Eng.) LeVeen, H. H.; Wapnick, S.; Falk, G.; Olivas, O.; Bhat, D.; Gaurdre, M.; Patel, M. (Veterans Admin. Hosp., Brooklyn, NY 11209). *Am. J. Surg.* 131(1):47-53; 1976.

To investigate whether antibiotics favorably modify the healing of colonic wounds, the effect of antibiotic colon preparation on the tensile strength and morphologic appearance of colonic anastomoses was investigated in 50 dogs in which the midsigmoid colon was divided and anastomosed. Preparation with preoperative kanamycin (500 mg, 3 times daily for 3 days) offered a slight benefit over mechanical bowel cleansing. The addition of erythromycin (250 mg, 3 times daily for 3 days) and kanamycin to the preoperative bowel preparation significantly ($p<0.001$) improved the mean tensile strength of the healing colonic anastomosis (mean=228 gm in animals treated with kanamycin only; 277 gm in animals treated with both antibiotics). Continuation of erythromycin and kanamycin for 1 week postoperatively almost doubled the mean tensile strength of the healing anastomosis (319 gm). Continuation of erythromycin without kanamycin in the postoperative period provided little protection (mean tensile strength, 278 gm) over the preoperative administration of kanamycin and erythromycin. Histologic examination showed that erythromycin and kanamycin given during the pre- and postoperative periods changed the mode of healing from that of secondary intention to healing by first intention. The findings support the concept that soilage of the peritoneal cavity at the time of elective colon surgery is not as important as leakage caused by poor anastomotic healing. Antibiotic bowel preparation with kanamycin and erythromycin improves the healing of colonic anastomoses.

4997 SOME UNCOMMON ROENTGENOLOGIC FINDINGS ASSOCIATED WITH ACUTE PERFORATIVE APPENDICITIS.

(Eng.) Joffe, N. (Beth Israel Hosp., 330 Brookline Ave., Boston, MA 02215). *Radiology* 110(2):301-305; 1974.

The cases of five patients with uncommon roentgenologic findings associated with acute perforative appendicitis are presented. In the first patient, a 30-yr-old man, there was a spontaneous occurrence of a cecosigmoid fistula. The appendiceal perforation presumably occurred at the time of a so-called episode of viral gastroenteritis 2 yr previously, as this was the only prior abdominal problem. In the second patient, a 10-yr-old girl, a preoperative abdominal radiograph revealed the presence of gas in the appendix. A barium study revealed a large collection of gas and fluid in the lesser sac, associated with generalized peritonitis and pus in the greater peritoneal sac. The presence of a gas and fluid collection in the lesser sac can be demonstrated by obtaining anteroposterior and lateral roentgenograms of the abdomen following opacification of the stomach with barium or Gastrografin. In the third patient, a 6-yr-old boy, a barium enema examination revealed a sharply circumscribed, smooth defect on the right posterior aspect of the distal sigmoid colon with stretching of the overlying mucosa; surgical exploration revealed a perforated appendix with a walled-off abscess adherent to and partly embedded within the wall of the sigmoid colon. A barium enema examination in the last patient, a 64-yr-old woman, revealed a filling of the appendix that communicated with an irregularly rounded cavity.
The pathologic findings suggested that this cavity was a walled-off abscess resulting from appendiceal perforation; this case demonstrates how so-called diverticula of the appendix may arise.

4998 ROENTGENOGRAPHIC FEATURES IN ANTIBIOTIC-ASSOCIATED PSEUDOMEMBRANOUS COLITIS.

(Eng.) Cho, K. J.; Ting, Y. M.; Chuang, V. P.; Lee, I. (Dept. Radiology, Univ. Michigan, Ann Arbor, MI 48132). *Australas. Radiol.* 20(1):38-41; 1976.

The radiologic findings in four cases of pseudomembranous colitis related to antibiotic therapy are reported. The antibiotics associated with the development of colitis included one or more of the following: clindamycin, gentamycin, vancomycin, colistin, ampicillin, and erythromycin. Barium enema showed a wide spectrum of roentgenographic features, ranging from mild, focal areas of mucosal irregularity to widespread involvement of the entire colon with multiple confluent pseudomembranes. The mucosal irregularity was caused by plaque-like pseudomembranes studding the mucosal surface. These varied in size and appeared as oval or rounded filling defects, mimicking pseudopolyps in air contrast studies. In profile, the pseudomembranes had a shaggy contour, simulating ulceration. Three patients showed nonobstructive dilation of the bowel, with an adynamic ileus gas pattern, and one of these had intramural gas in the cecum. Multiple areas of barium dissection under the pseudomembranes, and possibly under the mucosa, were seen in one patient. The diagnosis of pseudomembranous colitis was confirmed by sigmoidoscopy and biopsy.

4999 DIVERTICULAR DISORDERS OF THE COLON AND ASSOCIATED PATHOLOGY.

(Eng.) Berardi, R. S.; Siroospour, D. (Veterans Admin. Hosp., Des Moines, IA 50310). *Am. J. Proctol.* 27(2):45-54, 56; 1976.

The incidence of diseases associated with diverticular disorders of the colon was surveyed in 437 male patients. Diverticular disorders were divided into four types: asymptomatic diverticulosis was found in 309 patients (average age, 64.5 yr); diverticular disease occurred in 64 patients (average age, 65.2 yr); acute diverticulitis and its complications were seen in 32 patients (average age, 59.5 yr); and bleeding diverticulosis was found in 27 patients (average age, 59.5 yr). Associated pathology was found most commonly in the gastrointestinal tract (22.1%). Duodenal ulcer was the most common condition, and was found in 14.6% of the cases. Combined associated gastrointestinal pathology was found in 5.5% of the patients. The urogenital tract revealed pathology in 27.1% of the patients. The cardiovascular system was involved in 56.8% of the patients, while 19% had associated pathology of the respiratory system, and 15.8% had abdominal wall hernias. Diabetes mellitus was noted in 8.9% of the cases, and obesity in 8.2%. Anxiety depression was noted in 8.2% of the patients and accounted for almost 50% of the central nervous system involvements. The incidence of associated anal and colorectal pathology was higher in bleeding diverticulosis than in other types of diverticular disorders (25.9% versus 13.0%). Hypertension was found in 18.5% of the patients with bleeding diverticulosis, compared to 12.8% of all patients and 11.8% of all symptomatic patients. It is concluded that no common etiopathogenetic factor or factors is suggested between diverticular disorders of the colon and associated disease, over and above that which appears to be due to coincidence, chance, age of the patient, and/or anticipated incidence of the disease in the patient population studied.

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5000 DIAGNOSIS OF HIRSCHSPRUNG'S DISEASE BY PUNCH BIOPSY OF RECTUM. (Eng.) Pease, P. W. B.; Corkery, J. J.; Cameron, A. H. (Birmingham Children's Hosp., Ladywood Middleway, Ladywood, Birmingham B16 8ET, England). *Arch. Dis. Child.* 51(7): 541-543; 1976.

The safety and reliability of rectal punch biopsy in the diagnosis of Hirschsprung's disease were evaluated by examining 234 punch biopsy specimens from the rectum and colon of 112 children (aged < 1 week-12 yr). The procedure was carried out without bowel preparation, and a standard Chevalier-Jackson vocal cord biopsy forceps was used. Depending on the age of the patient, the samples were taken 2-3 cm above the dentate line to avoid the normal hypoganglionic zone. Biopsy was performed under general anesthesia in 47 patients. The specimens were 4-5 mm in diameter and were rounded or dome-shaped. They were fixed in buffered 10% formalin and processed to paraffin. Ganglion cells were considered absent if none were seen in 50 serial sections that included an adequate amount of submucosa; in addition, a diagnosis of Hirschsprung's disease was rejected unless the aganglionic sections also showed thickened nerve trunks. In 94% of the patients, the diagnosis of Hirschsprung's disease was confirmed or refuted by the first biopsy; a second biopsy was required in four patients. Hirschsprung's disease was diagnosed in 31% of the 112 patients, and all diagnoses were confirmed by histological examination of specimens resected during therapeutic pull-through operations. In four patients, the biopsy specimen included muscle as well as mucosa and submucosa; only one of these patients developed a serious complication (a large pelvic hematoma due to a combination of the biopsy procedure and the onset of hemorrhagic disease of the newborn and omission of preoperative vitamin K). The authors believe that full thickness rectal biopsy is no longer necessary or justified in the diagnosis of Hirschsprung's disease, and that punch biopsy is simple, safe, and reliable.

5001 PSYCHIATRIC ILLNESS AND THE IRRITABLE BOWEL SYNDROME: PRACTICAL IMPLICATIONS FOR THE PRIMARY PHYSICIAN. (Eng.) Young, S. J.; Alpers, D. H.; Norland, C. C.; Woodruff, R. A., Jr. (Washington Univ. Sch. Medicine, St. Louis, MO). *Gastroenterology* 70(2):162-166; 1976.

The results of a previous study that linked the irritable bowel syndrome and psychiatric illnesses were confirmed in a group of patients with the syndrome and in a control group. Twenty-nine consecutive outpatients (from an internal medicine group practice) with irritable bowel syndrome were given structured psychiatric interviews, as were 33 consecutive medical controls who did not have irritable bowel syndrome. Seventy-two percent of irritable bowel syndrome subjects had psychiatric illness, with hysteria (17%) and depression (17%) the most prevalent syndromes. Only 18% of controls had psychiatric illness. The primary physician made an accurate psychiatric assessment in only 28% of the subjects. An awareness of the patient's psychiatric illness is necessary for the physician to provide effective treatment, and to spare the patient needless medications, hospitalizations, and surgery.

5002 ACUTE DILATION OF THE COLON IN MALIGNANT LYMPHOMA. (Eng.) Wagonfeld, J. B.; Baker, A. L.; Reed, J. S.; Platz, C. E.; Kirsner, J. B. (Univ. Chicago, Pritzker Sch. Medicine, 950 E. 59th St., Box 400, Chicago, IL 60637). *Gastroenterology* 70(2):264-267; 1976.

The case of a 66-yr-old man with malignant lymphoma who developed acute dilatation of the colon with signs of systemic toxicity is presented. Although barium contrast x-rays taken previously were interpreted as consistent with granulomatous colitis, rectal biopsy revealed features characteristic of malignant lymphoma of the poorly differentiated lymphocytic type. Bone marrow and lymph nodes were also involved. The onset of dilatation was temporally related to theraphy with opiates and anticholinergics, and the acute episode was resolved with nasogastric suction, i.v. fluids, albumin, and antibiotics. This case suggests that this complication can occur in a patient without the destruction of the muscularis propria by deep ulcerations or degeneration of the myenteric plexus, which are seen in ulcerative colitis and granulomatous colitis.

5003 ELEVATED SERUM ACID PHOSPHATASE LEVELS WITH RECTAL CARCINOID TUMOR. (Eng.) Davidson, E. D.; McDougal, W. S. (Joseph B. Whitehead Dept. Surgery, Emory Univ., Atlanta, GA). *Gastroenterology* 70(1):114-116; 1976.

The case of a 52-yr-old man in whom a marked elevated serum acid phosphatase level was found in combination with a rectal carcinoid tumor with liver metastases is reported. The serum acid phosphatase level ranged from 2.5 to 5 IU. Tissue assays of the tumor, liver metastasis, and uninvolved liver revealed elevated acid phosphatase levels of 50.0, 74.5, and 3.7 mg phosphorus/mg tissue protein/hr, resp., when thymophthalein was used as a substrate in the assay and 152, 177, and 11 mM phosphate/mg tissue protein/min, resp., when β-glycerophosphate was used as a substrate. The patient also had elevated plasma serotonin (0.26 μg/ml) and urinary 5-hydroxyindole acetic acid (18 mg/24 hr) levels, and did not exhibit the carcinoid syndrome. Autopsy showed no prostate cancer or metastatic bone lesions. Serum acid phosphatase elevation may occur with carcinoid lesions of the rectum.

5004 COMPARISON OF 5-FLUOROURACIL WITH 5-FLUOROURACIL, CYCLOPHOSPHAMIDE, AND METHOTREXATE IN METASTATIC COLORECTAL CARCINOMA.

(Eng.) Richards, F., II; Pajak, T. L.; Cooper, M. R.; Spurr, C. L. (Bowman Gray Sch. Medicine, Wake Forrest Univ., Winston-Salem, NC 27103). *Cancer* 36(5):1589-1592; 1975.

The response of colorectal carcinoma to 5-fluorouracil (5-FU, 38 patients) or to a combination chemotherapy (CC, 38 patients) using 5-FU, cyclophosphamide (CP), and methotrexate (MTX). An additonal 16 patients were treated with CC after failing to respond to FU alone. Therapeutic effects and effects on survival were compared. 5-FU was given at 12 mg/kg, i.v., on days 1-5, followed 10-17 days later by maintenance therapy, which continued at weekly intervals for at least 6 treatment courses. The CC group received the same dose of 5-FU plus 10 mg/kg CP, i.v., and 0.1 mg/kg, i.v., MTX on day 1. Maintenance therapy began 10-17 days later. An objective response was defined as a 50% decrease in the product of the longest perpendicular diameters of the indicator lesions. Ten patients receiving 5-FU improved, and eight had an objective response; 10 patients in the CC group improved, and 7 had an objective response. Neither the response rates nor the duration were statistically different in the two groups. There was no significant difference between the survival of the two groups (6.5 and 6.8 months). Patients with impaired liver function did less well than patients with good liver function in both groups. More toxicity was experienced by patients receiving CC compared to 5-FU, but this was significant only for anemia and leukopenia. Six of 16 patients who switched from 5-FU to CC responded favorably. It is recommended that patients with metastatic colorectal carcinoma initially be given 5-FU alone (unless they have pulmonary metastases), and if they relapse or do not respond to this treatment, a trial with CC is warranted.

5005 HEPATIC ARTERY LIGATION AND 5-FLUOROURACIL INFUSION FOR METASTATIC COLON CARCINOMA AND PRIMARY HEPATOMA.

(Eng.) Ramming, K. P.; Sparks, F. C.; Eilber, F. R.; Holmes, E. C.; Morton, D. L. (54-140 Center Health Sciences, Univ. California Los Angeles, Los Angeles, CA 90024). *Am. J. Surg.* 132(2):236-242; 1976.

The results of treating nine patients with extensive bilateral hepatic metastases of colorectal cancer with hepatic artery ligation and continuous infusion of 5-fluorouracil (5-FU) are reported. Silastic catheters were inserted into the hepatic artery at laparotomy, and continuous perfusion was effected by a Sigmamotor pump. There was no operative mortality or morbidity, and drug toxicity was acceptable. The dosage averaged 10 mg/kg/day (2.5-14 mg/kg/day) for an average of 63 days. Liver function in all patients returned to preoperative values within 2 weeks, and four patients showed improvement of preoperative liver function for 3-6 months after perfusion. Two patients had palpable regressions lasting 5 months or more, and one patient had a slight palpable regression for 2 months. The five who died had a mean survival of 10.4 months after therapy. Eight of the nine patients showed significant clinical improvement following treatment. Seven patients with irresectable primary liver carcinoma were treated with continuous 5-FU infusion. A Silastic catheter was placed into the hepatic artery via the gastroduodenal artery at laparotomy; ligation of the hepatic artery was not performed. There was no operative mortality or morbidity. The dosage averaged 10 mg/kg/day for an average of 140 days. Significant clinical improvement was noted in six of the seven patients, although this did not correlate with improvement of hepatic function. All six responding patients are still living (mean survival, 14 months). Prolongation of life with hepatic artery infusion of 5-FU has been significantly better than with any previously reported chemotherapy for this disease.

5006 FECAL STEROIDS AND BACTERIAL FLORA IN PATIENTS WITH POLYPOSIS COLI.

(Eng.) Watne, A. L.; Lai, H.-Y. L.; Mance, T.; Core, S. (West Virginia Univ. Medical Center, Morgantown, WV 26506). *Am. J. Surg.* 131(1):42-46; 1976.

Fecal neutral and acid steroids and bacterial flora were studied in 9 patients with untreated polyposis coli, in 6 patients with polyposis coli who had undergone ileorectostomy at least 1 month before the study, and in 14 normal controls. The nine untreated patients showed higher mean concentrations of cholesterol, cholic acid, and chenodeoxycholic acid (14.69, 0.6, and 0.8 mg/g dry weight, resp.) than the controls (6.0, 0, and 0 mg/g, resp.). These levels in the six treated patients increased even more after ileorectostomy (preoperative: 12.1, 0.6, and 0.8 mg/g, resp.; postoperative: 17, 2.4, and 2.1 mg/g, resp.). The bacterial flora of the patients with polyposis coli showed an anaerobe/aerobe ratio of 2.7:1, with a relative increase in clostridia and bifidobacteria and a decrease in eubacteria and bacteroides. After ileorectostomy, the clostridia disappeared, as did ruminococcus, peptostreptococcus, and fusobacteria; eubacteria and lactobacilli decreased and bifidobacteria and bacteroides increased. Eubacteria showed a decrease from normal in the pre- and postoperative patients with polyposis coli, and this paralleled a decrease in coprostanol (preoperative, 6.5 mg/g; postoperative, 0 mg/g). The fact that the patients with polyposis coli excrete a significantly increased amount of cholesterol compared to coprostanol suggests some alteration in the fecal flora. A decrease in stool transit time resulting in diarrhea in these patients may be due to high

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levels of chenodeoxycholic acid. After ileorectostomy, the transit time in two patients decreased from a preoperative average of 19.4 hr to 14.2 hr.

5007 SURGICAL ANATOMY OF THE BLOOD SUPPLY OF THE COLON. (Ger.) Hansen, H. H.; Stelzner, F. (Zentrum der Chirurgie, Joh.-Wolfgang-Goethe-Universitat, D-6000 Frankfurt a.M., Theodor-Stern-Kai 7, W. Germany). *Langenbecks Arch. Chir.* 340(1): 63-74; 1975.

5008 POSTOPERATIVE COMPLICATIONS ON THE COLON. (Ger.) Deucher, F.; Oesch, I.; Blessing, H. (Chirurgische Klinik, Kantonsspital Aarau, CH-5001 Aarau, Switzerland). *Chirurg* 46(8):374-378; 1975.

5009 COMPLICATIONS AFTER COLOSTOMY CLOSURE: RESECTION OR EXTRAPERITONEAL CLOSURE? (Ger.) Schwemmle, K.; Feustel, H.; Gunselmann, U. (Chirurgische Klinik mit Poliklinik, Universitat Erlangen-Nurnberg, D-8520 Erlangen, Krankenhausstr. 12, W. Germany). *Chirurg* 46(8):379-381; 1975.

5010 FROM ANAL ATRESIA TO CONTINENCE ORGAN. (Ger.) Scharli, A. F. (Kinderchirurgische Abteilung, Kinderspital, Luzern, Switzerland). *Arch. Chir. Neerl.* 27(3):179-185; 1975.

5011 EPIDEMIOLOGY OF CANCERS OF THE COLON AND RECTUM. (Fre.) MacLennan, R. (Centre International de Recherche sur le Cancer, 150, cours Albert-Thomas, 69008 Lyon, France). *Bull. Cancer (Paris)* 62(4):411-418; 1975.

5012 THE ANTIGENIC TRANSLOCATION OF THE CARCINOEMBRYONIC ANTIGEN IN COLON TUMORS. (Rus.) Rogal'skii, V. Ia. (Moscow Scientific Res. Inst. Oncology, Russian SSR Ministry Health, Moscow, USSR). *Tsitologiia* 17(7):839-845; 1975.

5013 VILLOUS TUMORS OF THE RECTUM: REPORT OF 30 CASES. (Fre.) Hollender, L. F.; Blanchot, Ph.; Kohler, J. J.; Meyer, C. (Centre hospito-universitaire, 67 Strasbourg, France). *J. Chir. (Paris)* 110(3):203-216; 1975.

5014 URO-RADIOGRAPHIC INVESTIGATIONS IN PATIENTS WITH TUMORS IN THE LARGE BOWEL. (Ita.) Musumeci, R.; Doci, R.; Valente, M. (Intituto Nazionale per lo Studio e la Cura dei Tumori, Milan, Italy). *Tumori* 61(4):401-411; 1975.

5015 POLYPS OF THE COLON: A STUDY OF 356 CASES DISCOVERED DURING 2,067 ROUTINE NECROPSIES. (Fre.) Potet, F.; Slabodsky-Brousse, N.; Brousse, J. (Hopital Beaujon, 100, boulevard du General-Leclerc, F 92110 Clichy, France). *Arch. Fr. Mal. App. Dig.* 64(3):201-208; 1975.

5016 SO-CALLED INOPERABLE RECTAL CARCINOMA: CONTRIBUTION TO THE PROGNOSIS OF RECTAL CARCINOMA. (Ger.) Winkler, R. (Chirurgische Universitatsklinik, 2 Hamburg 20, Martinistrasse 52, W. Germany). *Med. Klin.* 70(22):977-980; 1975.

5017 TWO-TEAM ABDOMINOPERINEAL AMPUTATION OF RECTUM FOR CARCINOMA. (Cze.) Typovsky, K.; Kralik, J.; Koziel, M. (Chirurgicke oddeleni KNsP, Ostrava 3, Syllabova 19, Czechoslovakia). *Rozhl. Chir.* 54(6):357-361; 1975.

5018 PROBLEMS WITH THE ONE- OR TWO-STAGE OPERATIONS ON THE LEFT PART OF THE COLON FOR CARCINOMA. (Ger.) Junemann, A.; Sailer, R.; Derra, E., Jr. (Chirurgische Universitatsklinik, D-4000 Dusseldorf, Moorenstr. 5, W. Germany). *Langenbecks Arch. Chir.* 340(2):127-135; 1975.

5019 PSEUDOMEMBRANOUS COLITIS, A COMPLICATION OF ANTIBIOTIC THERAPY. REPORT OF 3 CASES. (Fre.) Roudier, M.; Delage, Y.; Roche-Sicot, J.; Bodin, F. (Hopital Saint-Antoine, 184, rue du Faubourg-Saint-Antoine, F 75012 Paris, France). *Arch. Fr. Mal. App. Dig.* 64(5):407-413; 1975.

5020 ACTIVITY OF INTESTINAL DISACCHARIDASE IN THE NORMAL CONDITION AND IN PATIENTS WITH CHRONIC ENTEROCOLITIS. (Rus.) Valenkevich, L. N. (Leningrad Medical Inst. Pediatrics, Leningrad, USSR). *Ter. Arkh.* 47(10):97-100; 1975.

5021 ACUTE POSTOPERATIVE ISCHEMIC ENTEROCOLITIS. (Fre.) Prandi, D.; Degott, C.; Molas, G.; Lortat-Jacob, J.-L. (Hopital Beaujon, 100, boulevard du General-Leclerc, F 92110 Clichy, France). *Arch. Fr. Mal. App. Dig.* 64(3):209-214; 1975.

5022 COLONIC DIVERTICULITIS. CLINICAL ASPECTS, INDICATIONS, AND OPERATIVE TREATMENT. (Ger.) Gieseler, H.; Volker, P. (Chirurgische Abteilung, Ev.-luth. Diakonissenanstalt, D-2390 Flensburg, W. Germany). *Munch. Med. Wochenschr.* 117(39): 1533-1536; 1975.

5023 COLON DIVERTICULOSIS AND COMPLICATING DIVERTICULITIS. (Ger.) Schautz, R. (Chirurgische Klinik, Juliusspital, D-8700 Wurzburg, Juliuspromenade 19, W. Germany). *Munch. Med. Wochenschr.* 117(39):1527-1532; 1975.

5024 VARIATIONS IN THE CLINICAL COURSE OF CHRONIC DIVERTICULITIS OF THE LARGE INTESTINE. (Rus.) Shirokova, K. I.; German, S. V. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Klin. Med. (Mosk.)* 53(10):48-52; 1975.

5025 MEGACOLON (HIRSCHSPRUNG'S DISEASE). RADIODIAGNOSTICAL AND THERAPEUTICAL PROBLEMS. (Ger.) Schickedanz, H.; Baudisch, E.; Schleicher, C.; Adam, G. (Chirurgische Klink der Friedrich-Schiller-Univeritat, DDR-69 Jena Bachstrasse 18, Germany). *Radiol. Diagn. (Berl.)* 16(3):345-349; 1975

5026 SCLEROSIS OF THE ANAL SPHINCTER FROM THE POINT OF VIEW OF MECHANICAL ILEUS. (Ger.) Vorster, C. F.; Tataru, V.; Weustermann, E. (Allgemeinchirurgische Abteilung des Friederikenstiftes, D-3000 Hannover, Humboldtstrasse 5, W. Germany). *Munch. Med. Wochenschr.* 117(39):1541-1546; 1975.

5027 RADIOLOGIC SIGNS FOR THE DIFFERENTIAL DIAGNOSIS BETWEEN ILEUS IN RENAL COLICS AND ILEUS OF ANOTHER ORIGIN. (Rum.) Valeanu, A.; Radulescu, D. (U.S.S.M., Sectia de radiologie Cluj, 19, Rumania). *Oncol. Radiol.* 13(2):115-124; 1974.

5028 ISCHEMIC STENOSIS OF THE COLON WITHOUT VASCULAR OCCLUSION OCCURRING IN THE POSTPARTUM: A CASE REPORT. (Fre.) Kerschen, A.; Weill, J.-P.; Weill-Bousson, M. (C.H.U., F 76005 Strasbourg Cedex, France). *Arch. Fr. Mal. App. Dig.* 64(5):421-429; 1975.

5029 UNUSUAL ETIOLOGY OF RECTAL STENOSIS: CARCINOMA OF THE PROSTATE. REPORT OF 4 CASES. (Fre.) Champault, G.; Steg, A.; Loygue, J. (Hopital Saint-Antoine, 184, rue du Faubourg-Saint-Antoine, F 75012 Paris, France). *Arch. Fr. Mal. App. Dig.* 64(7):613-619; 1975.

5030 THE TREATMENT OF ACUTE INVAGINATION OF SUCKLINGS AND INFANTS BY AIR INSUFFLATION INTO THE COLON. (Fre.) Mac, N. D.; Long, V. (Radiologische Klinik der Universitat Rostock, DDR-25 Rostock 1, Ernst-Heydemann-Strasse, W. Germany). *Radiol. Diagn. (Berl.)* 16(3):351-360; 1975.

5031 PERFORATION OF THE CECUM SECONDARY TO ACUTE IDIOPATHIC DILATATION OF THE COLON. (Fre.) Hay, J.-M.; Kaswin, R.; Tremolieres, F.; Maillard, J.-N. (Hopital Louis-Mourier, 178, rue des Renouillers, F 92700 Colombes, France). *Nouv. Presse Med.* 5(1):16-18; 1976.

5032 THE TREATMENT OF DISTURBANCES OF INTESTINAL MOTILITY. (Ger.) Richter, R. (Kantonsspital Basel, Univ.-Frauenklinik Schanzenstr. 46, 4004 Basel, Switzerland). *Praxis* 64(22):689-692; 1975.

See also, 4593, 4594, 4727, 4729, 4772, 4780, 4782, 4783, 4888, 4957, 4973, 5040, 5290, 5328, 5362.

LARGE INTESTINE

Ulcerative Colitis

5033 CIRCULATING ANTIBODIES TO BOVINE ALBUMIN IN ULCERATIVE COLITIS AND CROHN'S DISEASE: CHARACTERIZATION OF THE ANTIBODY RESPONSE. (Eng.) Falchuk, K. R.; Isselbacher, K. J. (Peter Bent Brigham Hosp., 721 Huntington Ave., Boston, MA 02115). *Gastroenterology* 70(1):5-8; 1976.

The presence of antibodies against bovine serum albumin (BSA) was investigated in the serum of 28 normal subjects and in 70 patients with inflammatory bowel disease and celiac disease. Antibodies to BSA were demonstrated in 28 of 30 patients with ulcerative colitis, 30 of 35 with Crohn's disease, 5 with untreated celiac disease, and in 12 normal subjects. In patients with inflammatory bowel disease, antibodies to BSA were present in greater amounts in those with severe and moderate disease than in those with mild disease. Moreover, in those patients with high titers of circulating antibody, the serum anti-BSA activity was always associated with immunoglobulin G and sometimes with immunoglobulin A. These findings suggest that an increased absorption of antigenic material and stimulation of antibody production may occur in association with intestinal mucosal damage, not only in ulcerative colitis and celiac disease, but also in Crohn's disease.

5034 UROLOGIC COMPLICATIONS OF INFLAMMATORY BOWEL DISEASE. (Eng.) Shield, D. E.; Lytton, B; Weiss, R. M.; Schiff, M., Jr. (Yale Univ. Sch. Medicine, New Haven, CT). *J. Urol.* 115(6):701-706; 1976.

Urinary complications were examined in 233 patients with inflammatory bowel disease. Because of changing concepts in inflammatory bowel disease, no attempt was made to correlate specific subclasses with urinary complications. Enterovesical fistulas de-

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veloped in 9 patients, with a mean duration of symptoms of 4.4 yr (range, 3 months-13 yr). Twenty patients had urinary tract calculi, with an average duration of symptoms of 9.6 yr. Rectovaginal complications occurred in 12 patients, while 1 patient each experienced neurogenic bladder, impotence, urethrocutaneous fistula, bladder calculi, and urethral stricture. Enterovesical fistulas may begin with formation of sinus tracts from the inflamed segment of bowel next to the bladder. This abscess cavity leads eventually to the irritative bladder symptoms and pyuria. Excision of the diseased bowel and resection of the involved portion of the bladder would be the treatment of choice. This procedure resulted in correction of the enterovesical fistulas in six of seven patients. The incidence of urinary calculi was especially high in patients who have had ileostomies (12.9%). The majority of calculi were composed of calcium salts. The authors suggest that urologic evaluation should be included in the long-term management of patients with inflammatory bowel disease.

5035 FATE OF THE RETAINED RECTUM AFTER SUBTOTAL COLECTOMY FOR INFLAMMATORY DISEASE OF THE COLON.

(Eng.) Binder, S. C.; Miller, H. H.; Deterling, R. A., Jr. (Tufts New England Medical Center, 171 Harrison Ave., Boston, MA 02111). *Am. J. Surg.* 131(2):201-203; 1976.

A retrospective review of 49 patients who survived subtotal colectomy for inflammatory disease involving both the colon and rectum was undertaken to evaluate the practice of retaining the rectum in patients requiring colectomy for inflammatory bowel disease. There were 26 male patients, and the ages of all patients ranged from 9 to 72 yr. Patients with granulomatous ileocolitis and granulomatous colitis not involving the rectum were excluded. Eleven patients have retained the rectal remnant from 1 to 14 yr, although only 2 of these patients had a successful ileoproctostomy. Of the remaining 38 patients, 2 patients with ulcerative colitis of 25- and 13-yr duration had peritoneal carcinomatosis secondary to colonic cancer at the time of colectomy and died postoperatively at 8 months and 2 yr, resp. Of the 36 other patients, 33 underwent subsequent combined abdominoperineal resection of the rectum after having persistent symptoms related to the retained rectum; 3 patients underwent the operation without these symptoms. All 36 had persistent active colitis in the rectum. By the end of 5 yr, only 6 of the 36 patients who eventually underwent abdominoperineal resection still retained the defunctioned rectal remnant. There were no postoperative deaths after subsequent combined abdominoperineal resection, but the rate of postoperative complications was 44.4%, and hospitalization averaged 17.5 days. For the patient whose rectum, along with the rest of the colon, is substantially diseased, one-stage total proctocolectomy is the preferred operation.

5036 COMPARATIVE MAPPING OF THE LOCAL DISTRIBUTION OF IMMUNOGLOBULIN-CONTAINING CELLS IN ULCERATIVE COLITIS AND CROHN'S DISEASE OF THE COLON.

(Eng.) Baklien, K.; Brandtzaeg, P. (Inst. Pathology, Rikshospitalet, Oslo 1, Norway). *Clin. Exp. Immunol.* 22(2):197-209; 1975.

The local B-cell responses in Crohn's disease were studied by determining the occurrence and distribution of immunoglobulin (Ig)-containing cells throughout the various layers of the inflamed bowel wall. Inflamed colonic tissue was obtained from 6 patients with Crohn's disease and from 11 patients with ulcerative colitis, and the responses of the Ig-containing cells were compared by paired immunohistochemistry. In the Crohn mucosa with persisting glands, the total cell count was, on the average, more than three times higher than controls. The numbers of IgA, IgM, and IgG immunocytes were increased 2.0, 4.8, and 28.6 times, resp. Only 0-2 IgD- and IgE-containing cells were generally found in each section. No consistent differences in the mucosal response pattern were revealed when Crohn's disease was compared with ulcerative colitis. The deeper layers of the bowel wall were infiltrated by immunocytes (IgG cells comprising about 80%) in both diseases. Immunoglobulin-containing cells in the muscularis propria and subserosa were characteristically found in Crohn's disease. There was no indication of a primary defect in the secretory Ig system, which appeared to be normal in areas with intact glands. The pronounced local humoral immune response, particularly that involving IgG, might be of pathogenetic importance by aggravating and perpetuating the inflammatory bowel disease.

5037 THE ELECTRICAL POTENTIAL DIFFERENCE ACROSS HUMAN ILEOSTOMY MUCOSA.

(Eng.) Isaacs, P. E. T.; Horth, C. E.; Turnberg, L. A. (Manchester Royal Infirmary, Manchester, England). *Gastroenterology* 70(1):52-58; 1976.

To elucidate the mechanisms underlying the change in ileal absorptive capacity that occurs after ileostomy, the potential difference (PD) between ileostomy lumen and forearm skin was measured in 28 subjects, 19 of whom had had ulcerative colitis and 9, Crohn's disease. The mean PD at 3-5 cm from the tip of the ileostomy was 17.2 ± 0.6 mV (SEM) in the ulcerative colitis group and 16.5 ± 1.1 mV in the Crohn's disease group. The PD was highest at the tips of ileostomies, and decreased to about half the tip level at 10-15 cm deep to the tip. Even at this distance from the tip, PD was apparently higher than values reported in normal ileum. PD rose during the first few weeks after colectomy and reached a stable value at about 2 months. Plasma aldosterone levels were normal in six subjects, but the administration of spironolactone (100 or 200 mg/day, p.o.) caused a fall in PD. These apparently conflicting observations suggest that the raised PD was maintained, at least in part, as a response to normal levels of aldosterone and an increased sensitivity to aldosterone by ileal mucosa near an ileostomy is postulated. A significant correlation between PD and salivary Na to K ratios also supports a relationship between PD and aldosterone levels. Another patient, with a jejunostomy, also had a high transmucosal PD, suggesting that jejunal mucosa may respond in a similar manner. No evidence in favor of active K secretion was discovered, because

K concentrations in ileostomy ejecta were no greater than those that could be predicted as a passive response to the PD, except in some subjects during the first week after surgery.

5038 SELECTIVE INTRAARTERIAL STEROID INJECTION IN ULCERATIVE COLITIS. (Eng.) Hiramatsu, K.; Asakura, H.; Baba, S. (Sch. Medicine, Keio Univ., Tokyo, Japan). *Acta Radiol.* [*Diagn.*] *(Stockh.)* 17(3):299-304; 1976.

The angiographic findings in 11 patients with ulcerative colitis, 10 of whom had received prednisolone intraarterially via the catheter, were compared with those in 32 control patients. For the examination, 35 ml of 76% Urografin were injected into the superior mesenteric artery, and 15 ml were injected into the inferior mesenteric artery (7 ml/sec). Prednisolone (10-25 mg) was injected into the inferior mesenteric artery in 10 patients, and in 7 patients it was injected into both the inferior and superior mesenteric arteries. There was a loss of the normal tapering of the vasa recta in all patients; intense capillary filling was observed in nine cases, and early venous filling in five. The mean width of the inferior mesenteric artery in patients with ulcerative colitis (5.7 mm) was significantly greater than that in the controls (4.1 mm). In the patients treated with steroids, moderate improvement occurred within 24 hr in four cases, and marked improvement occurred in five. The clinical symptoms remained unchanged in only one patient, despite a second injection into the superior and inferior mesenteric arteries.

5039 PYODERMA GANGRENOSUM IN ULCERATIVE COLITIS: PREVENTION OF THE GANGRENOUS COMPONENT. (Eng.) Gelernt, I. M.; Kreel, I. (Mount Sinai Sch. Medicine, Fifth Ave. and 100 St., New York, NY 10029). *Mt. Sinai J. Med. N.Y.* 43(4):467-470; 1976.

The cases of two patients with ulcerative colitis-associated pyoderma gangrenosum that was successfully treated with cyproheptadine are reported. The first patient, a 15-yr-old boy with a 9-yr history of ulcerative colitis, had diffuse pyoderma gangrenosum lesions on both lower limbs, the trunk, and the left arm. Within 24 hr of onset, several lesions had already become gangrenous and others were ecchymotic with gangrene imminent. Prednisone was increased from 15 to 30 mg daily, and cyproheptadine hydrochloride (4 mg, 4 x daily) therapy was begun. No lesion, which was not already gangrenous, progressed to necrosis, and the erythematous early lesions resolved within 3 days. The ecchymotic lesions cleared after about 10 days. The second patient, a 20-yr-old woman with an 11-yr history of ulcerative colitis, had exacerbated colonic symptoms and a single pretibial lesion. Four years previously, pyoderma gangrenosum had developed on the leg and had taken 8 months to resolve, despite increased steroid doses. During the present episode, the lesion completely disappeared 6 days after the first dose of cyproheptadine hydrochloride. The gangrenous phase of the pyoderma lesion in ulcerative colitis can be prevented with early administration of cyproheptadine. This drug is of special value in diseases characterized by frequent rectal bleeding; it prevents platelet thrombi in vessels, the effect is rapid, and it does not produce bleeding diathesis. Pyoderma lesions will progress to early resolution if the ischemic ulcer is avoided.

5040 CHARACTERISTICS OF SOME CHANGES OF THE LIVER AND PANCREAS FUNCTION IN COLITIS OF VARIOUS FORMS. (Rus.) Abdullaev, N. Kh.; Askarov, A. A.; Latipov, A.; Kasymov, I. Yu.; Oblayarov, D. O.; Shakirov, E. A.; Alibekova, M. G.; Dyakova, S. I. (Inst. Rural Medicine, Uzbek SSR Ministry Health, Tashkent, USSR). *Ter. Arkh.* 47(9):120-125; 1975.

5041 EXCRETORY FUNCTION OF THE PANCREAS IN NONSPECIFIC ULCERATIVE COLITIS. (Rus.) Kravchenko, L. F.; Syrovatskaia, E. P. (Vladivostok Medical Inst., Vladivostok, USSR). *Ter. Arkh.* 47(9):39-42; 1975.

5042 TREATMENT OF PATIENTS WITH NONSPECIFIC ULCERATIVE COLITIS CONSIDERING THE PATHOGENETIC SIGNIFICANCE OF SOME INDICES OF OXYGEN EXCHANGE DISORDERS. (Rus.) Primak, F. Ia., Zemlianskii, V. N. (Kiev Medical Inst., Kiev, USSR). *Vrach. Delo* (7):18-24; 1975.

5043 COURSE OF PREGNANCY IN CROHN'S DISEASE AND ULCERATIVE COLITIS. (Ger.) Morl, M.; Rottler, H. (No affiliation given). *Z. Gastroenterol.* 14:260; 1976.

See also, 4981, 5233, 5355, 5356, 5362, 5363.

PANCREAS

5044 THE RISK AND ACCURACY OF PANCREATIC BIOPSY. (Eng.) Lightwood, R.; Reber, H. A.; Way, L. W. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *Am. J. Surg.* 132(2):189-194; 1976.

The risk and accuracy of pancreatic biopsy were evaluated in 171 patients. The indications for surgery were obstructive jaundice (75 patients), suspected tumor (52), abdominal pain (11), chronic pancreatitis (12), and miscellaneous other diagnoses (15). The procedure produced complications (hemorrhage, pancreatitis, or duodenal leak) in eight patients and death in three of these. The diagnosis was confirmed in 86% of the cases, but was falsely negative in 14% of pancreatic cancers. Of the 136 direct wedge biopsies performed, 3% resulted in complications and none resulted in death. Of the 22 direct needle biopsies, 14% produced complications and 9% resulted in death. Ten percent of 19 transduodenal biopsies resulted in complications, and there was a 5% mortality rate. Wedge biopsy was used in 77 of 87 biopsies in cancer patients, and produced false-negative results 10 times (13%). The other 10 biopsies were done with a Vim-Silverman needle, and false-negative occurred in 5. Transduodenal biopsy was accurate for all except one patient. Wedge biopsy appeared preferable to needle biopsy, except for periampullary lesions in which transduodenal needle biopsy was best. When the biopsy incision transected a pancreatic duct, suture ligation and drainage avoided complications. Open transduodenal biopsy of periampullary lesions was reliable, but the duodenotomy closure leaked in 10% of the cases. Pancreatic biopsy with confirmation of malignancy should precede pancreaticoduodenectomy in most cases of suspected pancreatic cancer.

5045 PANCREATIC SECRETION IN PATIENTS WITH CHRONIC RENAL FAILURE. (Ger.) Otte, M.; Thurmayr, R.; Dobbelstein, H.; Stahlheber, H.; Forell, M. M. (Med. Klink., Univ. Munich, Munich, W. Germany). *Verh. Dtsch. Ges. Inn. Med.* 80:541-544; 1974.

Parameters of pancreas secretion were studied in 15 patients with advanced chronic renal failure (glomerulonephritis, pyelonephritis, and interstitial nephritis due to phenacetin abuse), and compared with similar findings in normal subjects and in patients with chronic relapsing pancreatitis, chronic calcereous pancreatitis, carcinoma of the pancreas, and chronic and acute duodenal ulcer. The Wilcoxon test and multivariate discrimination analysis were used for the statistical evaluation of the data. Following stimulation of pancreas secretion with cholecystokinin, secretin, ox bile extract, and their combinations, the normal maximal bicarbonate concentration was measured in the duodenal juice in the patients with chronic renal failure despite partly marked serum acidosis. The trypsin and lipase levels in the duodenal juice were normal in most patients, while the amylase level differed significantly from that of normal subjects. The serum lipase levels increased following stimulation in almost all cases. The multivariate statistical analysis indicates that patients with chronic renal insufficiceny show a disease-specific pancreatic secretion, which is neither normal nor typical for chronic pancreatitis or pancreatic carcinoma, but which is similar to that observed in duodenal ulcer.

5046 ATTEMPTED RETROGRADE CANNULATION OF THE AMPULLA: A PROBABLE CAUSE OF MASS IN THE PANCREAS. (Eng.) Bloom, G. P.; Fromm, D.; Rosenberg, S.; Goldman, H. (Hartford Hosp., Hartford, CT). *Ann. Surg.* 183(2):107-108; 1976.

Two cases of focal asymptomatic pancreatitis following attempted retrograde cannulation of the ampulla of Vater, which presumably produced a mass involving the head of the pancreas, are described. Serum amylase rose to 229 U following unsuccessful cannulation in the first patient, a 71-yr-old woman with gallstones and a history of spironolactone exposure. A focal mass with no evidence of fat necrosis or surrounding edema was found at laparotomy in the head of the pancreas. A pancreatoduodenectomy was performed, because the lesion grossly resembled carcinoma of the head of the pancreas; however, microscopic sections revealed acute interstitial pancreatitis limited to the head of the pancreas. The second patient, a 64-yr-old woman, had normal amylase levels before and after the unsuccessful procedure, but a 3 x 3 cm, firm localized mass with surrounding mild edema was found in the head of the pancreas; it resembled carcinoma, but dissection revealed a collapsed distal common duct. An operative cholangiogram demonstrated obstruction at the junction of both common hepatic ducts and a normal common duct, with free flow into the duodenum distally. Biopsy of the bifurcation of the hepatic duct showed primary adenocarcinoma. It is concluded that manipulations associated with the attempted retrograde cannulation of the ampulla may produce a focal inflammatory reaction in the head of the pancreas.

5047 CLINICAL FUNCTIONAL EXPLORATION OF THE EXOCRINE PANCREAS. (Fre.) Husson, J.-M. (Hopital Broussais, 96, rue Didot, 75014 Paris, France). *Rev. Med. (Paris)* 17(7):377-384; 1976.

5048 IV. ENDOSCOPIC CHOLANGIOPANCREATOGRAPHY: RADIOLOGICAL ASPECTS OF THE NORMAL AND PATHOLOGICAL PANCREAS. (Fre.) Bourgie, J.-R.; Bessette, G. (Hopital Maisonneuve-Rosemont, Montreal, P.Q., Canada). *Union Med. Can.* 105(1):68-76; 1976.

5049 ^{75}Se-SELENIUM-METHIONINE UPTAKE OF THE PANCREAS AS AN INDICATOR OF ITS EXCRETORY CAPACITY. (Ger.) Markwardt, J.; Nauber, G.; Wolf, E.; Markwardt, H. (No affiliation given). *Radiol. Diagn. (Berl.)* 17(1):139-140; 1976.

5050 REPORT OF ONE CASE OF SEROUS CYSTADENOMA OF THE PANCREAS. (Fre.) Kauny, Y.; Le Peltier, J. (Hopital Preah Ket Mealea, Phnom Penh, Cambodia). *Chirurgie* 101(5):311-315; 1975.

5051 CANCERS OF THE PANCREAS. (Fre.) Fontaine, J.-L. (Hotel Dieu de Paris, 75004 Paris, France). *Rev. Med. (Paris)* 17(7):397-403; 1976.

5052 TREATMENT OF PANCREATIC CANCER. (Fre.) Anonymous. (No affiliation given). *Rev. Med. (Paris)* 17(7):403-405; 1976.

5053 STATE OF THE EXTERNAL SECRETORY FUNCTION OF THE PANCREAS IN PATIENTS WITH CHRONIC HEART INSUFFICIENCY. (Rus.) Pocheptsov, E. V. (Kharkov Medical Inst., Kharkov, USSR). *Vrach. Delo* (2):36-38; 1976.

See also, 4752, 4758, 4767, 4768, 4793, 4794, 4800, 4802, 4810, 4811, 4812, 4813, 4875, 4877, 4894, 4959, 5040, 5041, 5057, 5100, 5175, 5232, 5260.

Pancreatitis

5054 PROGNOSTIC SIGNS AND NONOPERATIVE PERITONEAL LAVAGE IN ACUTE PANCREATITIS.

Eng.) Ranson, J. H. C.; Rifkind, K. M.; Turner, T. W. (New York Univ. Medical Center, New York, NY). *Surg. Gynecol. Obstet.* 143(2):209-219; 1976.

n on-going clinical study was undertaken in 300 consecutive patients with acute pancreatitis to evaluate methods for the early identification of this disease and to assess the influence of treatment on its course. Pancreatitis was associated with alcoholism in 207 patients, biliary tract disease in 51 patients and other conditions in 42. Twenty-two patients died, and an additional 34 patients required more than 1 week of treatment in intensive care. Retrospective analysis of the first 100 patients identified 11 objective findings that correlated with the occurrence of serious illness or death. They were on admission: age over 55 yrs, a blood glucose level over 200 mg%, a WBC count over 16,000/mm^3, a serum lactic dehydrogenase level over 350 IU/l, and an SGOT level over 250 Sigma Frankel U. During the initial 48 hr of therapy, the findings were hematocrit value decreased over 10 percentage points, serum calcium level below 8 mg%, base deficit over 4 mEq/l, a blood urea nitrogen level increase over 5 mg%, estimated fluid sequestration over 6 l, and arterial oxygen tension less than 60 mm of mercury. Prospective application of these signs in the latter 200 patients permitted the accurate early identification of those with severe pancreatitis. Only 1 of 162 patients with fewer than three of these early features was seriously ill or died, while 24 of 38 patients with three or more early positive findings were seriously ill or died. The objective early identification of patients with severe pancreatitis permits more vigorous management of this group and provides a basis for the selection of patients for the evaluation of proposed improved therapies. Percutaneous peritoneal dialysis in severe pancreatitis was evaluated in 10 patients with three or more positive early signs who were randomly assigned to dialysis or continued conventional care. Morbidity was strikingly reduced in patients who underwent dialysis. Death or more than 9 days of intensive care occurred in two of five patients who did not receive dialysis, while all five patients having dialysis recovered after fewer than 9 days of intensive care treatment. Serious illness or death occurred in 31 of the first 100 patients. There has been a similar fall in mortality from 15.0 to 3.5%. Factors that may contribute to this improvement include the objective early identification of patients with severe disease, the avoidance of early laparotomy whenever practical, the prolongation of nasogastric suction until all evidence of pancreatic inflammation has resolved, careful monitoring of respiratory function, and early treatment of pulmonary complications and peritoneal dialysis in patients with severe disease.

5055 A STUDY OF AUTOPSIES UPON 116 PATIENTS WITH ACUTE PANCREATITIS.

(Eng.) Storck, G.; Pettersson, G.; Edlund, Y. (Dept. Surgery III, Univ. Goteborg, Goteborg, Sweden). *Surg. Gynecol. Obstet.* 143(2):241-245; 1976.

The necropsy findings in 116 patients with fatal, acute pancreatitis were analyzed with special attention to hepatic dysfunction. This series includes the total fatalities caused by the disease between 1956 and 1970; all but two patients died in the first attack of acute pancreatitis. The patients were divided into four etiologic groups: gallstone disease, 43%; alcoholism, 25%; disease of idiopathic origin, 18%; and diseases originating from abdominal operations, 14%. Over the three 5-yr periods (1956-1960, 1961-1965, and 1966-1970), the frequency of alcohol abuse as a predisposing factor increased, while gallstone disease showed a corresponding decrease. About 75% of the patients had hyperbilirubinemia (4.9 mg/100 ml). Half of these showed signs of cholestasis. Macroscopic steatosis of the liver was recorded in 62% of the alcohol addicts and in about 25% of the patients in the other etiologic groups. Shock and late sequelae of shock were the dominating immediate causes of death in 72% of the cases. About 50% of the fatalities occurred within the first week. Most of these early deaths were caused by intractable circulatory failure. Early death was most commonly caused by alcoholism, followed in frequency by gallstone disease. It is possible that impaired hepatic function contributes to the fatal outcome in both the early and late phases of the disease.

5056 THE MECHANISM OF INCREASED RENAL CLEARANCE OF AMYLASE IN ACUTE PANCREATITIS.

(Eng.) Warshaw, A. L.; Lee, K.-H. (Massachusetts General Hosp., Boston, MA 02114). *Gastroenterology* 71(3):388-391; 1976.

A study was undertaken to determine whether the increased amylase clearance in pancreatitis is a function of preferential clearance of isoamylases of pancreatic origin, metabolism of circulating amylases to a more readily excreted form, or greater renal permeability to all amylases. Amylase isoenzymes, separated by polyacrylamide gel electrophoresis, were measured in 25 normal subjects (mean amylase to creatinine clearance ratio, 3.0%), 15 patients with acute pancreatitis (mean clearance ratio, 9.5%; $p<0.0001$), and 6 patients with hyperamylasemia due to common duct stones (mean clearance ratio, 4.0%). In normal serum and urine, two isoamylases (P_1 and P_2) resembling pancreatic isoenzymes and three isoamylases (S_1, S_2, and S_3) resembling salivary isoenzymes appeared regularly. Salivary amylases predominated in the serum, but pancreatic amylases predominated in urine. This finding supports the hypothesis that the renal clearance of pancreatic amylases exceeds that of salivary amylases under normal conditions. In patients with pancreatitis or common duct stones, essentially all of the increased amylase activity in serum and urine was due to pancreatic isoamylases (P_1 and P_2) in their normal proportions. No new or altered amylase isoenzymes were detected. The fraction of pancreatic amylases in the serum or urine was identical for the two diseases. As the difference in amylase to creatinine clearance ratios observed between the two groups of patients was not a function of different amylases isoenzymes presented in the kidney, it is concluded that the increased amylase clearance in acute pancreatitis is caused by an alteration of renal transfer of amylase, either at the glomerulus or tubule.

5057 PANCREATIC ABSCESS FOLLOWING ACUTE PANCREATITIS. (Eng.) Holden, J. L.; Berne, T. V.; Rosoff, L., Sr. (Univ. Southern California Sch. Medicine, Los Angeles, CA). *Arch. Surg.* 111(8): 858-861; 1976.

The records of 28 patients who were treated by surgical drainage for pancreatic abscess following acute pancreatitis were analyzed to evaluate the use of the drainage procedure. There was a lull in the clinical course of the antecedent pancreatitis prior to the time of surgical drainage in 70% of the cases. Despite an aggressive surgical approach, there were major postoperative problems in 26 patients. Sepsis persisted in 14 patients. Major gastrointestinal hemorrhage occurred in 7 patients, intra-abdominal bleeding in 9 patients, and fistulization in 13 patients. Fourteen patients died. The operative treatment of pancreatic abscess must be aggressive and persistent. In addition to extensive drainage with soft sump drains, pressure against bowel or major vessels, must be avoided. Reoperation should be considered if postoperative improvement is not sustained.

5058 MARKED ALKALINE PHOSPHATASE ELEVATION WITH PARTIAL COMMON BILE DUCT OBSTRUCTION DUE TO CALCIFIC PANCREATITIS. (Eng.) Snape, W. J., Jr.; Long, W. B.; Trotman, B. W.; Marin, G. A.; Czaja, A. J. (Philadelphia General Hosp., 700 Civic Center Blvd., Philadelphia, PA 19104). *Gastroenterology* 70(1):70-73; 1976.

A syndrome of partial common bile duct obstruction and marked elevation in serum alkaline phosphatase occurring in six male alcoholic patients with calcific pancreatitis was characterized. A marked elevation in serum alkaline phosphatase (105-3,275 mU/ml) was associated with minimal, if any, elevation in serum bilirubin (0.2-8.6 mg/100 ml) in each patient. In four patients tested for BSP retention (45 min), the level was less than 5% in three patients and 7% in one. In all cases, the alkaline phosphatase was hepatic in origin, and i.v. or operative cholangiography showed a dilated common bile duct. Liver biopsy showed canalicular bile stasis in four patients and bile duct proliferation in two patients. This study demonstrates that calcific pancreatitis may cause partial bile duct obstruction, which differentially increases serum alkaline phosphatase without altering bilirubin or BSP excretion.

5059 ULTRASTRUCTURAL STUDIES IN CHRONIC HUMAN PANCREATITIS. (Ita.) Gulla, P.; Tristaino, B.; Giordano, P. (Istituto di Clinica Chirurgica e Terapia Chirurgica, Universita di Perugia, Perugia, Italy). *Acta Chir. Ital.* 31(3):357-365; 1975.

Biopsy samples from five patients with chronic pancreatitis were examined by electron microscopy to investigate the existence of an autoimmune factor in the pathogenesis of chronic pancreatitis. The walls of the involved capillaries showed severe alteration of the endothelium and a disrupted structure, very similar to their appearance after administration of ferritin. Extensive lymphocytic infiltration, and alterations in the acinus cells (increase in lipids, vesicles, altered membrane, and mitochondria) and endothelial cell walls support the hypothesis of serum antibody movement. An autoimmune response reacting with a chronic inflammation is suggested by these observations.

5060 HEREDITARY CHRONIC CALCAREOUS PANCREATITIS (REPORT OF A NEW CLINICAL CASE). (Por.) Veiga, A.; Feijao, J. N.; Rodrigues, H. A.; Lima, M. L.; Abrantes, A.; Cardoso, G. (Hospital de Dona Estefania, Servico No. 6, Lisbon, Portugal). *Bol. Clin. Hosp. Civis Lisb.* 35(1/4):267-274; 1973/1974.

5061 ACUTE PANCREATITIS. (Fre.) Bouvresse, M. (Hopital Cochin, 75014 Paris, France). *Rev. Med. (Paris)* 17(7):385-396; 1976.

5062 HITHERTO NOT DESCRIBED PATHOLOGICAL FINDINGS AND CLINICAL CONDITIONS IN PANCREATITIS IN CHILDREN. (Rum.) Janec, M. (Klinika pediatrickej chirurgie Lekarskej fakulty UK, Bratislava, Czechoslovakia). *Rozhl. Chir.* 54(9):654-658; 1975.

5063 EVALUATION OF DIAGNOSTIC POSSIBILITIES IN CHRONIC PANCREATITIS. (Slo.) Bucko, A.; Kopec, A.; Ovecka, M. (Vyskumny ustav vyzivy ludu, klinicke oddelenie, Bratislava, nam. 4. aprila 7, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 29(4): 217-224; 1975.

5064 DIAGNOSIS OF WATER-ELECTROLYTE DISORDERS IN ACUTE PANCREATITIS. (Rus.) Baikova, Z. Z.; Seferovsky, L. E.; Lipnitsky, E. M. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (11):109-113; 1975.

5065 COMPLEX TREATMENT OF PATIENTS WITH ACUTE PANCREATITIS. (Rus.) Karaman, N. V.; Kravchuk, A. N.; Zimovsky, V. L.; Goikhman, V. E. (Odessa Medical Inst., Odessa, USSR). *Vrach. Delo* (11):58-61; 1975.

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5066 PROSPECTIVE STUDY OF THE RESULTS OF THE TREATMENT OF ACUTE PANCREATITIS WITH OR WITHOUT PROTEINASE INHIBITORS. (Fre.) Kirsch, A.; Werner, U.; Weckner, W. (Chirurgische Klinik, Stadtisches Krankenhaus im Friedrichshain, 171 Leninallee, 1017 Berlin, E. Germany). *Lyon Chir.* 71(5):306-308; 1975.

5067 IS SURGERY NECESSARY FOR ACUTE PANCREATITIS? (Rus.) Gadzhiev, A. S. (Kemprovo Medical Inst., Kemorovo, USSR). *Klin. Khir.* (2):60-63; 1976.

5068 EARLY OPERATION IN ACUTE HEMORRHAGIC NECROTIZING PANCREATITIS. (Ger.) Kummerle, F.; Neher, M.; Schonborn, H.; Mangold, G. (Chirurgische Universitatsklinik, 65 Mainz, Langenbeckstr. 1, W. Germany). *Dtsch. Med. Wochenschr.* 100(44):2244-2245; 1975.

5069 ACUTE PANCREATITIS AND MUCOSAL DIVERTICULUM OF THE DUODENAL WINDOW. (Fre.) Rives, J.; Lardennois, B.; Flament, J.-B. (Centre Hospitallier Universitaire de Reims, 45, rue Cognacq-Jay, 51100 Reims, France). *Chirurgie* 101(8):558-571; 1975.

See also, 4809, 4243.

LIVER AND BILIARY TRACT

5070 BEHAVIOR OF THE PORTAL VEIN SYSTEM IN MAN AFTER LAPAROTOMY. (Eng.) Eisele, R.; Dissmann, W., Kotter, D.; Nasseri, M.; Thimme, W. (Klinikum Charlottenburg, Berlin, W. Germany). *Surg. Gynecol. Obstet.* 141(6):870-874; 1975.

The behavior of the portal vein system following laparotomy was examined in 41 patients with stomach or colon disease. Before the peritoneum was closed, a catheter was placed in the portal vessel. Portal venous pressure was measured at intervals up to the ninth day, and oxygen and carbon dioxide pressures were measured in portal and venous blood. The arterial oxygen pressure ranged from 70.1 to 67.0 mm Hg, and that of the portal vein ranged from 49.9 to 44.4 mm Hg. The mean values for calculated oxygen content were 1.95, 2.28, 2.08, and 1.58 volume-percent on days 1, 2, 3-4, and 7-9, resp. In all patients, the portal venous pressure increased significantly, and with one exception, was greater than the increase in the arterial system, resulting in a significant ($p<0.01$) drop from 6.9 to 4.8 mm Hg in the portal-central pressure gradient. Cardiac output (measured in 10 patients) increased significantly (range, 6.4 to 8.51 l/min), while the average total arteriovenous oxygen difference decreased from 4.7 to 3.3 volume-percent ($p<0.05$). It is concluded that laparotomy does not influence portal venous pressure or the portal-central venous pressure gradient.

5071 A STUDY OF KINETIC PARAMETERS FOR THE USE OF SERUM ORNITHINE CARBAMOYLTRANSFERASE AS AN INDEX OF LIVER DAMAGE. (Eng.) Drotman, R. B. (Procter and Gamble Co., Ivorydale Technical Center, 5299 Spring Grove Ave., Cincinnati, OH 45217). *Food Cosmet. Toxicol.* 13(6):649-651; 1975.

A simple radiometric assay for serum ornithine carbamoyltransferase (OCT) is described, and the results of studies in which this assay was used to measure OCT activity in normal and CCl_4-treated Cox CD rats are presented. $^{14}CO_2$ released from [^{14}C-ureido]-L-citrulline (0.0227 μCi/μmol, 10 μmol/ml) into the incubation medium by arsenolysis (0.1 M sodium arsenate, pH 6.7) was used as a measure of enzyme activity. The $^{14}CO_2$ was trapped in 1.5 M-NaOH and measured directly by liquid scintillation spectrometry. Serum OCT was stable for at least 2 weeks when stored frozen. Linear relations were observed between $^{14}CO_2$ formation and the time of incubation, and between $^{14}CO_2$ formation and enzyme concentration. When the serum was dialyzed, ornithine and phosphate were not present in large enough concentrations to inhibit the arsenolysis of citrulline (1.6 μmol $^{14}CO_2$/0.4 ml undialyzed serum, 1.3 μmol following dialysis). When rats were injected i.p. with graded doses of CCl_4 (0.0, 37.5, 75.0, 150.0, and 300.0 μl/kg), there was a progressive increase in OCT activity (104, 650, 1,478, 11,275, and 33,308 disintegrations per min/0.4 ml serum or 4, 26, 59, 360, and 1350 μmol/24 hr/l serum for the respective doses of CCl_4). Therefore, the measurement of serum OCT activity is a sensitive index of liver damage and may be of practical use in the toxicology laboratory.

5072 THE SERUM PREALBUMIN SIGNIFICANCE IN THE DIFFERENTIAL DIAGNOSIS OF LIVER DISEASES. (Ger.) Groza, S. (Medizinische Fakultat der Universitat Beograd, Bulevar Revolucije 207/Ill, Belgrade, Yugoslavia). *Med. Klin.* 71(9):378-379; 1976.

Serum prealbumin levels were measured by the Mancini method in 20 healthy subjects, 30 patients with acute hepatitis, 24 patients with chronic hepatitis, and 11 patients with cirrhosis of the liver. The serum prealbumin content averaged 47.4 mg% in the controls, 14.0% in patients with liver cirrhosis, 11.6% in patients with acute viral hepatitis, 33.3% in patients with chronic aggressive hepatitis, and 70.8% in patients with chronic persistent hepatitis. It appears that serum prealbumin determinations may be of value in differentiating chronic persistent hepatitis from chronic aggressive hepatitis. The prealbumin determination does not seem useful for differentiating chronic aggressive hepatitis from cirrhosis of the liver.

5073 PROLYL HYDROXYLASE ACTIVITY IN NORMAL AND DISEASED HUMAN LIVER. (Eng.) Fuller, G. C.; Nolan, J. C.; Fink, S.; Rodil, J. V. (Coll. Pharmacy, Univ. Rhode Island, Kingston, RI 02881). *Proc. Soc. Exp. Biol. Med.* 151(1):61-64; 1976.

The level of prolyl hydroxylase activity in normal and diseased human liver was examined in liver biopsies from 10 adult men. The specimens were examined histopathologically. Prolyl hydroxylase activity was measured in whole homogenates using a method based on the stoichiometric formation of ^{3}H water and ^{3}H-hydroxyproline, when a substrate consisting of a polypeptide with 4-^{3}H-proline was incubated with the enzyme and cofactors. The values obtained could be classed into three populations representing high, low, and intermediate enzyme levels. These corresponded to clinical groupings of active aggressive fibrosis, and normal and active liver disease, resp. The data from this and other studies indicate that this procedure provides a rapid and convenient means of estimating the extent of active fibrogenesis. A ninefold increase in prolyl hydroxylase was observed in patients with aggressive alcoholic hepatitis with only early minimal histopathological evidence of existing fibrosis. Since this technique can be used to predict the progression to cirrhosis in patients with chronic liver disease, and can be done with rapidity, it could be a valuable diagnostic tool.

5074 OSTEOPATHIES AND CALCIUM RESORPTION IN CHRONIC LIVER DISEASES. (Ger.) Gossmann, H. H.; Schaumloffel, E.; Miller, B.; Martini, G. A. (Kreiskrankenhauses, 59 Siegen, Kohlbettstrasse 15, Marburg, W. Germany). *Z. Gastroenterol.* 13(6): 594-598; 1975.

Disturbances in calcium resorption, and their relation to osteoporosis in patients with chronic liver disease, was studied in 16 patients with cirrhosis and in 2 patients with chronic hepatitis. Seven patients had radiologically and histologically proven osteoporosis, and one patient had osteoporomalacia. Calcium-45 (1-3 µCi, p.o.) was administered in 250 ml of buttermilk (about 200 mg calcium); 1 hr later, calcium-47 (6-8 µCi, i.v.) was administered to determine the endogenous excretion rate. The calcium resorption rate was calculated from the excreted calcium-45 activity as a percentage of the administered dosage. Total resorption was evaluated from the calcium resorption rate and the endogenous secreted calcium-47 activity. No reduction in the calcium resorption was observed in patients with liver cirrhosis and chronic hepatitis. The osteoporosis accompanying chronic liver diseases is most probably due to lack of motor activity, muscular atrophy, chronic pancreatitis, alcoholism, and low calcium diet, rather than to reduced calcium resorption. Osteomalacia is a consequence of prolonged cholestasis. Vitamin D is indicated in osteomalacia. The results of this study show no decrease in calcium resorption in patients with cirrhosis of the liver and chronic hepatitis; vitamin D therapy is not indicated.

5075 AN ATTEMPT AT STATISTICAL CORRELATION BETWEEN INTRA-HEPATIC IMMUNOCYTES AND Ig-LEVELS IN LIVER DISEASES. (Fre.) Gardais, J.; Hurez, D. (Centre Hospitalier Regional, 49036 Angers Cedex, France). *Pathol. Biol. (Paris)* 23(9):683-689; 1975.

Needle biopsies were performed on 71 patients with various hepatic diseases (24 with steatosis, 37 with cirrhosis, and 10 with hepatitis). The immunocytes reacting with specific conjugated antisera anti-immunoglobulin G (IgG), -IgA, and -IgM were counted. Immunoelectrophoresis counts were above normal in steatosis, 27 cirrhosis, and in 9 hepatitis patients; a monoclonal IgM was found in 1 patient with hepatitis. Regardless of the illness, the average number of immunocytes reacting with the anti-IgA specific antiserum was always greater than that corresponding to the anti-IgG and anti-IgM antisera. It was impossible to statistically correlate immunocytochemical data with Ig levels. It is suggested that the increase in immunoglobulins is related to an increased, rather than a decreased, catabolism. The infiltration of the hepatic parenchyma and the portal spaces by immunocytes may be reponsible for the increased count of serum immunoglobulins.

5076 LYMPH VESSEL SYSTEM AND LIVER: FUNCTIONAL AND PATHOPHYSIOLOGICAL RELATIONSHIP. (Ger.) Foldi, M. (Fa. Schaper & Bruemmer, D-3320 Saltzgitter 61, Bahnhofstr. 35, W. Germany). *Leber Magen Darm* 4(6):274-279; 1974.

In almost all hepatopathies, the lymphatic system is involved. The protein concentration of hepatic lymph is 80-95% that of blood plasma; 70-100% of all circulating plasma proteins are transported by the hepatic lymph vessels to the blood circulation each day. Lymph formation in the liver probably occurs in the sinusoids, but also in biliary and gallbladder capillaries. Ascites in hepatic cirrhosis causes increased lymphatic flow and intralymphatic pressure, resulting in drainage into the peritoneal cavity. Determination of the protein concentration in the ascitic fluid and the lymph enables evaluation of the state of the liver cirrhosis. Occlusion of the lymphatic vessels or insufficient drainage results in damage to the liver cell and the reticuloendothelial system. An accurate definition of the role of the lymphatic system is an important prerequisite for the evaluation of therapeutic treatment of liver diseases.

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5077 SERUM GASTRIN LEVELS FOR VARIOUS LIVER DISEASES. (Jpn.) Takaoka, Y.; Katayama, A. (Osaka Prefectural Hosp., Osaka, Japan). *Radioisotopes* 24(2):56-58; 1975.

The serum gastrin level in patients with various liver diseases was measured using a gastrin kit, and compared with that in normal healthy controls. Seventeen patients had acute hepatitis, 40 chronic hepatitis, 47 cirrhosis, and 8 hepatoma. The gastrin level in the healthy patients in early morning before breakfast was 107.3 ± 33.4 pg/ml. There was no difference in the serum gastrin level of the chronic hepatitis and cirrhosis patients compared to controls. The average serum gastrin level of the acute hepatitis patients was 86.4 ± 31.1 pg/ml, and that of the hepatoma patients was 145.3 ± 117.5 pg/ml. The effect of Honig beef bouillon cubes on changes in the serum gastrin level was examined in 13 patients, as was the time required to reach the maximum serum gastrin level after its administration. The patients reached a peak gastrin level after 10 min and after 60 min, the level returned to that of the empty stomach. Two patients with chronic hepatitis showed extremely high serum gastrin levels after 10 min (350 and 380 pg/ml).

5078 TREATMENT OF VARIOUS LIVER DISEASES WITH (+)-CYANIDANOL-3, A NEW HEPATO-PROTECTIVE SUBSTANCE. (Eng.) Martinez Lopez, J. M.; Sanchez de la Cuesta, F.; Calvo Fernandez, R. Garrida Toro, A.; Merchante Cobos, J. *In: New Trends in the Therapy of Liver Diseases. Proceedings of the International Symposium on New Trends in the Therapy of Liver Diseases, Tirrenia, June 6-7, 1974.* Bertelli, A., ed. (New York: S. Karger): pp. 201-206; 1975.

A new hepato-protective drug, (+)-cyanidanol-3 (C-3), was clinically evaluated in 40 patients with liver disease, either of alcoholic or iatrogenic origin, or acute hepatitis of heterogeneous origin. Thirty-eight patients received 6 tablets per day, and two patients whose disease was not so severe received 3 tablets per day. The biochemical parameters examined included urobilin, biliary pigments and salts, urobilinogen, sedimentation rate, total bilirubinemia, prothrombin time, transaminase, phosphatases, lactate dehydrogenases, serum lability, and when needed for diagnosis, liver biopsy and the BSP test. Of the 12 patients with alcohol-induced liver disease, 2 showed very good results, 7 showed good results, 2 showed fair results, and 1 did not respond. The majority of symtoms in these cases disappeared, but there was a persistence of anorexia, arthromyalgia, and discrete hepatomegaly. Bilirubinemia, transaminases, and alkaline phosphatases returned to normal levels. Of the 14 patients in the iatrogenic group, 3 showed a very good response, 10 showed a good response, and 1 showed a fair response. Flatulence, meteorism, and constipation persisted at the end of treatment. Patients with heterogeneous liver disease showed 2 very good responses, 9 good responses, 1 fair response, and 1 lack of response. At the end of treatment, the most persistent clinical symptoms were lassitude, migrane, and arthromyalgia. One response was unaccounted for in the tables.

5079 HEPATIC EFFECTS OF ORAL CONTRACEPTIVES. (Fre.) Emond, M.; Beaudoin, M. (Departement de medecine, hopital Notre-Dame, 1560 est, rue Sherbrooke, Montreal H2L 4K8, Canada). *Union Med. Can.* 104(10):1539-1541; 1975.

Hepatic effects of oral contraceptives and contraindications to their use are reviewed. Outside of Chili and Sweden, cholestasis due to oral contraceptives is very rare. When it does occur, the jaundice usually disappears without a trace within 2 weeks of cessation of the drug. Oral contraceptives are contraindicated if the woman has had a gravidic cholestasis. Cases of chronic hepatic disease (chronic active hepatitis, primary biliary cirrhosis) and familial hyperbilirubinemia (Dubin-Johnson and Gilbert syndromes) are relative contraindicators to oral contraceptives. Hepatic tests do not have to be systematically checked in normal women taking oral contraceptives.

5080 LIVER TRANSPLANTATION FOR BUDD-CHIARI SYNDROME. (Eng.) Putnam, C. W.; Porter, K. A.; Weil, R., III; Reid, H. A. S.; Starzl, T. E. (Univ. Colorado Medical Center, 4200 E. Ninth Ave., Denver, CO 80220). *JAMA* 236(10):1142-1143; 1976.

The first use of liver replacement for the treatment of the Budd-Chiari syndrome is reported. Ten months before the operation, the patient, a 22-yr-old woman, experienced right upper quadrant pain, nausea, vomiting, and abdominal distention. There was progressive enlargement of the liver and spleen, the development of spider angiomas, increasing ascites, peripheral edema, and episodes of hepatic encephalopathy. The diagnosis was confirmed by liver biopsy and by a venacavogram. Narrowing of the inferior vena cava and occlusion of the hepatic veins by organized and recanalized thrombus were seen. Two months before transplant, the patient's renal function began to deteriorate. The donor (a 21-yr-old woman) and recipient had mismatches of all four antigens of the histocompatibility antigen A and B loci. The removal of the diseased liver was made difficult by dense fibrosis around the suprahepatic and retrohepatic inferior vena cava, but the hepatectomy was facilitated by a retrograde technique that allowed the dissection of the suprahepatic vena cava to be postponed until just before the removal of the specimen. Postoperatively, the patient received azathioprine, prednisone, and a 3-week course of heterologous antilymphocyte globulin. Liver rejection did not occur, and renal function was restored within 3 weeks. Two episodes of fever associated with elevated liver enzymes were thought to represent cholangitis and were easily controlled with antibiotics. The patient has normal liver function 16 months after the transplant.

5081 EARLY DIAGNOSIS OF PRIMARY LIVER CARCINOMA. (Ger.) Weiss, W.; Dittrich, H.; Baumgartner, G.; Blazek, F.; Eder, G.; Hanak, H.; Hentschel, E.; Kahn, P.; Mastnak, C.; Urbanek, A.

(1. Medizinische Abteilung, Hanusch-Krankenhaus, Heinrich-Collin-Strasse 30, A-1140 Vienna, Austria). *Wien. Med. Wochenschr.* 126(1/3):16-22; 1976.

The incidence and diagnosis, as well as a diagnostic program, of primary carcinoma of the liver (PCL) in an Austrian hospital were evaluated. Forty cases of PCL were found in 1973-74 among 560 gastrointestinal patients. A high-risk group consisted of patients with decompensated liver cirrhosis, suspicion of occult neoplasms, or liver scintigrams showing parenchymal defects. Diagnostic criteria were medical history, clinical symptoms, laboratory tests, especially α-fetoprotein, liver scintigraphy, and angiography. α-Fetoprotein was present in the plasma of 88-90% of patients with hepatocellular carcinoma. Thirty-four of the 40 patients with PCL died. The diagnosis was confirmed by autopsy in 30 cases; in the remaining cases, autopsy was not performed. This test is prefered to more sensitive tests, which have the disadvantage of a higher rate of wrong positive results. Laparoscopic biopsy diagnosis is rejected as a routine procedure, since it proves right in only 40-60% of the cases.

5082 A CASE OF PRIMARY UNDIFFERENTIATED SARCOMA OF THE LIVER: DIAGNOSED BY PERITONEOSCOPY AND GUIDED BIOPSY.

(Eng.) Esposito, R.; Pollavini, G.; de Lalla, F. (Univ. Milan Medical Sch., Via Livigno 3, I-20158 Milan, Italy). *Endoscopy* 8(2):108-110; 1976.

A rare case of primary undifferentiated liver sarcoma is reported. The patient, a 36-yr-old man, presented with jaundice, right upper quadrant pain, hepatomegaly, and a nontender, round mass in the abdomen. Peritoneoscopy and needle biopsy were performed. The biopsy specimen revealed a marked variation in cellularity, with cells varying from spindle to polyhedral shape, and some foreign body giant cells. There was a uniform distribution of reticulum fibers characteristic of a sarcoma, and the histological diagnosis was undifferentiated liver sarcoma. The patient died 2 months later, and the diagnosis was confirmed at autopsy.

5083 FOCAL NODULAR HYPERPLASIA OF THE LIVER, BENIGN HEPATOMAS, ORAL CONTRACEPTIVES AND OTHER DRUGS AFFECTING THE LIVER.

(Eng.) Grabowski, M.; Stenram, U.; Bergqvist, A. (Univ. Hosp., Lund, Sweden). *Acta Pathol. Microbiol. Scand.* [A] 83(6):615-622; 1975.

Cases of focal nodular hyperplasia of the liver and benign hepatoma occurring in two Swedish hospitals were examined to establish the association between these lesions and oral contraceptives. Twenty-six cases of focal nodular hyperplasia of the liver and seven benign hepatomas were found in women between 1960 and 1974. Since 1963, the year before oral contraceptives were introduced in Sweden, focal nodular hyperplasia has been diagnosed in eight women in the reproductive period of life, four of whom had taken oral contraceptives. The four diagnoses were established between 1972 and 1974. At most, 25% of Swedish women between the ages of 15 and 44 yr have been on oral contraceptives. Three epileptics and three diabetics were in the group with focal nodular hyperplasia. At least two epileptics had been treated with barbiturates and/or hydantoins. The prevalance of drug-treated epilepsy in Sweden is 0.4-0.5%, and of diabetes about 2%. Drugs provoking an increase of hepatic smooth-surfaced endoplasmic reticulum and proliferation of vascular fibrous tissue in a part of the liver that previously may have been damaged by vascular disturbances or trauma may be involved in the etiology of focal nodular hyperplasia. No relationship between benign hepatomas and drugs was found. The observations support the theory that oral contraceptives are involved in the development of focal nodular hyperplasia of the liver, although the sample is too small for epidemiological and statistical analysis.

5084 REVERSIBILITY OF HEPATIC LESIONS CAUSED BY CHOLELITHIASIS.

(Ger.) Reichmann, J.; Holle, G.; Wohlgemuth, B.; Bienia, M.; Schumann, C. (Kreiskrankenhaus, 74 Altenburg, Leipziger Strasse 5, Leipzig, E. Germany). *Dtsch. Gesundheitswes.* 31(6):267-271; 1976.

To determine the speed of the reversibility of pathological changes in the liver associated with biliary disease, biopsies were performed on 2,325 patients who were operated on for gallstones. Histological examination of the biopsies revealed that liver damage was present in 61.8% of the patients. Diffuse fatty liver was seen in 13.3%, probably due to diabetes mellitus and sensitivity to certain nutritional stimuli, combined with adiposis. In 12.9% of the biopsies, biliary hepatitis and secondary biliary cirrhosis were present, whereas another 12% showed residual cholangitic changes. In all other patients, the pathological changes could be attributed to cholelithiasis. A second biopsy was performed on 159 patients. Complete or very extensive regression occurred in most patients, if no complications or secondary operations interfered with the healing process. Inflammatory changes disappeared fastest and most strikingly within 5-7 months. Hepatitis with toxic parenchymal damage normally reversed within a yr. Marked fatty degeneration of the liver was often present after 1 yr, and even increased in some cases. Since the reversibility and the degree of liver damage depend on the duration and the severity of the cholelithiasis, early treatment of this disease is clearly indicated.

5085 ESTROGEN THERAPY INTRAHEPATIC CHOLESTASIS: CHARACTERISTICS OF HIGH-RISK PATIENTS.

(Eng.) Neilan, L. (Georgetown Univ. Sch. Medicine, Washington, DC). *J. Am. Med. Wom. Assoc.* 31(3):97-108; 1976.

To predict those women in whom estrogen therapy

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could result in intrahepatic cholestasis, an attempt was made to determine risk factors from clinical reports of jaundice or pruritus and biochemical analysis of bile of women on estrogen therapy. Estrogen causes cholestasis primarily by reducing bile salt formation and bile flow. It also inhibits bilirubin entry into the hepatocyte and its subsequent conjugation with glucuronic acid. Estrogen alters serum lipoproteins, labilizes lysosomes, and increases cholesterol, which could change the nature of the cell membrane at the canaliculi. Most canaliculi show dilation, reduction in number and height of microvilli, and a few whorl bodies. Liver biopsy can provide definitive evidence for intrahepatic cholestasis. Most patients become jaundiced on estrogen therapy in the first 2 months. Hypertriglyceridemia is commonly seen in women with cholestatic jaundice. Bile stasis is suspected as a cause of pancreatitis by reflux into the common bile duct. Serum alkaline phosphatase and serum copper elevations are the most indicative test for cholestasis evaluation. Radioimmunoassay of bile salts may prove useful in detecting impaired liver function from estrogen therapy before the clinical appearance of jaundice or pruritus.

5086 INTRAHEPATIC CHOLESTASIS WITH PARENTERAL ALIMENTATION. (Eng.) Rodgers, B. M.; Hollenbeck, J. I.; Donnelly, W. H.; Talbert, J. L. (J. Hillis Miller Health Center, Gainesville, FL). 32610). *Am. J. Surg.* 131(2):149-155; 1976.

An attempt was made to define the clinicopathologic correlates of intrahepatic cholestasis resulting from parenteral alimentation in 11 neonates. Six of the neonates weighed less than 2.0 kg at birth, and five of these were estimated to be 30 weeks or less gestational age. The infants were alimented by standard techniques with a 20% glucose solution containing 2.5 g/100 ml protein (except one case, which received 3.25 g/100 ml protein). Alimentation was carried out for an average of 75 days (range, 26-236 days) during which it was supplemented with oral or gastrostomy feedings. All of the neonates had moderate to severe elevation of serum bilirubin at some point during the i.v. alimentation (IVA; range, 3.6-23.1 mg/100 ml). Serum bilirubin levels peaked on an average of 29 days after the onset of IVA (range, 4-47 days). There were significant liver enzyme abnormalities in seven infants; SGOT ranged between 115 and 2,530 U. Alkaline phosphatase (measured in 4 patients) ranged between 58 and 100 King-Armstrong U. Discontinuation of IVA resulted in a return to normal of serum bilirubin and liver function. In the two infants that survived, liver function studies have remained normal for 2.5 yr. While the cause of cholestasis associated with parenteral alimentation is unknown, this study indicates that it may be associated with prematurity and with sepsis. The authors propose that careful monitoring of liver function parameters be carried out in all infants on total or partial parenteral alimentation, and especially on premature infants. Persistent elevations of serum bilirubin and SGOT indicate that IVA should be discontinued, if at all feasible.

5087 PHENOBARBITAL AND CHOLESTYRAMINE IN RECURRENT INTRAHEPATIC CHOLESTASIS. (Hun.) Laszlo, B.; Mehesfalvi, E. (Fovarosi Laszlo Korhaz, Budapest, Hungary). *Orv. Hetil.* 116(23):1343-1345; 1975.

Successful phenobarbital and cholestyramine treatment of two patients with recurrent intrahepatic cholestasis is reported. Phenobarbital therapy (135 mg/day, p.o.), initiated after 30 days of refractory jaundice (5th crisis) in a 23-yr-old man, caused only partial and temporary improvement. Similar improvement was achieved with cholestyramine (12 g/day), after 30 days of phenobarbital treatment. Phenobarbital therapy (135 mg/day), combined with the ongoing cholestyramine therapy on the 90th day of the jaundice, resulted in rapid normalization (cessation of pruritus, normocholic feces, and a drop in the serum bilirubin level and in the alkaline phosphatase activity). The patient was discharged symptom-free 25 days after the initiation of the combined therapy. A 17-yr-old man, presenting with familial recurrent intrahepatic cholestasis, had had four icteric crises lasting 137, 65, 58, and 67 days, and he received a combination of phenobarbital (100 mg/day) and cholestyramine (12 g/day) during his fifth crisis. Rapid normalization occurred. He was discharged symptom-free 24 days after the initiation of the combined therapy. The duration of the fifth crisis was only 29 days. These two cases suggest a possible synergism between phenobarbital and cholestyramine; however, additional evidence is required to confirm that the rapid regression of symptoms of recurrent intrahepatic cholestasis is due to the therapeutic effectiveness of the phenobarbital-cholestyramine combination.

5088 FACTOR VII LEVELS AS A GUIDE TO PROGNOSIS IN FULMINANT HEPATIC FAILURE. (Eng.) Gazzard, B. G.; Henderson, J. M.; Williams, R. (King's Coll. Hosp. Medical Sch., London, England). *Gut* 17 (7):489-491; 1976.

Because of a recent suggestion that reductions in levels of clotting factor VII to less than 9% of normal indicate a poor prognosis in patients with grade IV hepatic encephalopathy, clotting factor VII was measured in 12 patients in grade IV hepatic coma for up to 36 hr. Five patients regained consciousness after receiving an average of three charcoal hemoperfusions. Only four of these patients survived, the fifth died 2 weeks later of an infection. Factor VII levels at the time of admission were below 9% of normal in four of the five patients who regained consciousness. Subsequent levels in these four patients increased to 9% or above. In six of the seven fatal cases, the hepatocyte volume fraction was less than 20%; these patients died of a complication of acute hepatic failure. In three fatal cases, the factor VII levels on admission were greater than 9% of normal, but fell below 9% in two of these three patients. The results indicate that the initial factor VII levels were not useful in predicting the prognosis of patients in grade IV hepatic coma. Serial determinations were a more useful predictor; the levels fell in those who died, whereas a rise was observed in those who recovered. It appears unlikely that any single test will be completely reliable in determining the prognosis of this condition.

5089 STUDIES IN PORPHYRIA. V. DRUG OXIDATION RATES IN HEREDITARY HEPATIC PORPHYRIA.

(Eng.) Anderson, K. E.; Alvares, A. P.; Sassa, S.; Kappas, A. (Rockefeller Univ., New York, NY). *Clin. Pharmacol. Ther.* 19(1):47-54; 1976.

To determine if there is a diminshed heme synthesis in hereditary hepatic porphyria, cytochrome P-450 function was assessed in 10 patients with the disease in remission and in seven asymptomatic genetic carriers. The mean plasma half-life of antipyrine was prolonged (21.69 ± 1.92 hr) in the 10 patients with disease, 8 of whom had acute intermittent porphyria (AIP) confirmed by decreased erythrocyte uroporphyrinogen-1-synthetase (URO-S) activities, and 2 of whom had mixed hepatic porphyria, in comparison to the mean of 20 normal control subjects (12.65 ± 0.86 hr, $p<0.01$). Antipyrine half-life was especially prolonged in patients with a history of more severe symptoms, but there was no correlation with the degree of elevation in urinary excretion of the porphyrin precursors δ-aminolevulinic acid (ALA) and porphobilinogen (PBG). The elimination rates of antipyrine from plasma were normal in the seven carriers of the AIP gene defect who had normal urinary ALA and PBG levels. The phenylbutazone half-life was normal in the 10 porphyric patients. The results demonstrate that the cytochrome P-450-dependent enzyme system for oxidizing antipyrine, but not that for phenylbutazone, is impaired in some AIP individuals in whom the gene defect for the disorder is clinically expressed, and that this impairment may be related to the severity of the disease. The partial decrease in URO-S activity characteristic of AIP does not result in a profound or generalized decrease in hepatic cytochrome P-450 function, even when there is sufficient derangement in the hepatic heme biosynthetic pathway to lead to excessive excretion of chemical intermediates in the pathway.

5090 THE HUMAN HEPATOCYTE IN STEATOSIS: AN ULTRASTRUCTURAL STUDY. THE RECONSTRUCTIVE EFFECT OF PHOSPHATIDYLCHOLINES WITH POLYENE TYPE FATTY ACIDS.

(Fre.) Alliet, J.; Comlan, G.; Gourdier, D. (Laboratoire d'Histologie-Embryologie, UER de Medecine, Caen, France). *Ouest Med.* 29(2): 85-104; 1976.

Ninety-four children (18 months-6 yr) in a state of severe denutrition (kwashiorkor) were treated either with lecithins and unsaturated fatty acids (total of 18 days), first by perfusion then p.o. when the state of consciousness of the patient allowed it, or with standard hyperprotein treatment, or with both. Biopsies were performed before, during, and after treatment. Hepatic steatosis caused by denutrition was expressed at the level of the hepatocyte by the disruption of cellular ultrastructure. There were zones of densification and rupture on the hepatocytic membrane. The nucleus contained either a hypertrophied nucleolus or two to three nucleoli. The nuclear membrane was dilated, due to an excess of lipids, and accompanied by a loss of ribosomes on the membrane and degranulation of the rough endoplasmic reticulum. There were also mitochondrial anomalies (loss of crests) and hypertrophy of the Golgi apparatus. Lecithins with polyene fatty acids restored membrane structure most rapidly; membrane enzymatic activity resumed. The almost complete disappearance of the intrahepatocytic excess of lipids was indicative of a recovered hepatocellular morphology. Three typical case histories are presented.

5091 REYE'S SYNDROME IN AN ADULT.

(Eng.) Morse, R. S.; Holmes, A. W.; Levin, S. (Emory Univ. Sch. Medicine, 69 Butler St., S.E., Atlanta, GA 30303). *Am. J. Dig. Dis.* 20(12):1184-1190; 1975.

The case of a 25-yr-old man with Reye's syndrome is reported. The usual prodromal symptoms of an upper respiratory infection followed by slight improvement followed by the development of vomiting, encephalopathy, mental confusion, and hepatic dysfunction were seen. During his recovery, the patient manifested clinical jaundice; the cause was unclear, although he had received one injection of thorazine. Histological examination of a liver biopsy specimen revealed fatty vacuolization of the hepatocytes with minimal mononuclear inflammatory infiltrate, and electron microscopy revealed an extensive fatty infiltrate, distorted mitochondria, and deglycogenation. The serum influenza B titer was elevated (1:128), although this did not change during the observation period. Cytomegalovirus (≤1:8) was isolated in the urine, but no other manifestation of cytomegalovirus infection was noted. The serum amino acid elevations in this patient were more generalized than those in other reported cases of Reye's syndrome. The patient never manifested depressed glucose levels in the blood or in a single-determination cerebrospinal fluid. The patient was treated with p.o. neomycin, catharsis, and protein restriction. He improved rapidly and had no residual evidence of liver or central nervous system damage. The fact that Reye's syndrome has now been diagnosed in an adult is stressed.

5092 AN OUTBREAK OF HEPATIC VENO-OCCLUSIVE DISEASE IN NORTH-WESTERN AFGHANISTAN.

(Eng.) Mohabbat, O.; Younos, M. S.; Merzad, A. A.; Srivastava, R. N.; Sediq, G. G.; Aram, G. N. (Inst. Pathology, Univ. Kabul, Kabul, Afghanistan). *Lancet* 2 (7980):269-271; 1976.

An outbreak of veno-occlusive disease (VOD) of the liver caused by consumption of *Heliotropium* seeds is reported. Approximately 1.5 yr after a 2-yr period of severe drought in north-western Afghanistan, 22.6% of a population of 7,200 developed evidence of liver disease. There were 1,034 males and 598 females, 46% of them under 14 yr of age. Early symptoms included

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anorexia, lassitude, and weight loss; severe abdominal distension and emaciation developed within several weeks. Jaundice and fever were rare, and in about 10% of patients, the liver was not palpable. The disease was usually fatal within 3-9 months. In 21 hospitalized patients who had the disease for 1-6 months, the mean serum albumin, serum globulin, SGPT, and alkaline phosphatase levels were 3.2 g/dl, 3.3 g/dl, 46 U, and 14.0 King-Armstrong U, resp. Clinical improvement was observed in 18 cases after 3-9 months of supportive hospital treatment; the 3 remaining patients, who had more advanced disease, died. Five autopsy specimens and 16 percutaneous liver biopsy specimens were examined. Microscopically, there was striking centrilobular congestion with extreme hemorrhagic necrosis of the parenchymal cells, and the central veins were often unrecognizable. These abnormalities had almost disappeared in the liver biopsy specimens from three patients who had complete clinical recovery after 9 months in the hospital. Contamination of flour with *Heliotropium* seeds was the cause of the outbreak. The alkaloid content (primarily heliotrine and lasiocarpine) in samples of wheat flour varied from 0.500% to 0.186%, and traces of alkaloid were detected in urine specimens from five patients.

5093 HEPATIC VENO-OCCLUSIVE DISEASE ORIGINATING IN ECUADOR. (Eng.) Lyford, C. L.; Vergara, G. G.; Moeller, D. D. (167 South Conwell, Casper, WY 82601). *Gastroenterology* 70(1):105-108; 1976.

A case of hepatic veno-occlusive disease manifested by massive ascites is described. A 35-yr-old woman had consumed an herbal tea containing a Crotalaria plant species for 6 months prior to evaluation. For 6 weeks she had consumed 2 liters, and subsequently 1 liter daily of the brew. She developed marked ascites, prominent superficial abdominal veins, and hepatomegaly. The inferior vena cava and hepatic veins were patent by angiography. Liver biopsy showed histological changes typical of hepatic veno-occlusive disease, consisting of centrilobular congestion and sublobular hepatic vein obstruction. Complete clinical, biochemical, and histological recovery was documented 1 yr after ingestion of the brew was discontinued. This is the first case known to be reported from Ecuador and the first to be diagnosed in the United States.

5094 AN EPIDEMIC OF VENO-OCCLUSIVE DISEASE OF LIVER IN CENTRAL INDIA. (Eng.) Tandon, B. N.; Tandon, H. D.; Tandon, R. K.; Narndranathan, M.; Joshi, Y. K. (All-India Inst. Medical Sciences, Ansari Nagar, New Delhi-110016, India). *Lancet* 2 (7980):271-272; 1976.

A second outbreak of veno-occlusive disease occurring in the Sarguja district of India in November-December 1975 is reported. Of 67 reported cases, 28 were fatal. Thirty-three patients were examined. Pain in the epigastrium followed by rapid abdominal distension was the most common presenting symptom. All but one patient had ascites. Three of the 17 patients in whom liver function was tested had hyperbilirubinemia, and 13 had slightly raised serum alkaline phosphatase values. All 17 patients were negative for hepatitis B surface antigen. Pathological examination of biopsy and autopsy specimens revealed large areas of centrilobular hemorrhagic necrosis. In all autopsy liver specimens, the central and sublobular veins showed varying degrees of occlusion with edematous collagenous connective tissue. This outbreak was probably caused by consumption of a cereal heavily contaminated with seeds of the *Crotalaria* species, which contain alkaloids of the pyrrolizidine group.

5095 FAMILIAL HEPATIC VENOOCCLUSIVE DISEASE WITH PROBABLE IMMUNE DEFICIENCY. (Eng.) Mellis, C.; Bale, P. M. (Royal Alexandra Hosp. Children, Camperdown, 2050, New South Wales, Australia). *J. Pediatr.* 88(2):236-242; 1976.

The cases of five infants with venoocclusive disease that appeared not to be associated with dietary or other extrinsic causes are presented. Hypogammaglobulinemia was severe in three infants and borderline in another. In one case, the failure of development of lymphoid germinal centers indicated immune disease. *Pneumocystis carinii* pneumonia occurred in four infants. It seemed unlikely that this was secondary to malnutrition, as there was no alveolar plasma cell reaction, and only one infant had wasted limbs. Numerous Hassall's corpuscles were found in the thymus, also suggesting a humoral immunity deficiency. Whether hypogammaglobulinemia was related to venoocclusive disease of the liver or was merely coincidental to it in these cases could not be determined. Microcephaly, multiple small cerebral softenings, yellow regenerative nodules, and left atrial endocardial fibrosis were also observed. The authors suggest that congenital immunodeficiency may have caused the venoocclusive disease in these cases.

5096 HEPATOLENTICULAR DEGENERATION: BIOCHEMICAL AND THERAPEUTIC CONSIDERATIONS. (Ita.) Mancinella, A.; Bartolucci, E. (Ospedale Civile Carretta, Montebelluna, Italy). *Clin. Ter.* 76(6):567-576; 1976.

The histological and clinical aspects of Wilson's disease are reviewed. It is characterized histologically by an abnormal deposit of copper in various tissues and clinically by extrapyramidal symptoms, psychic disorders, and cirrhosis. Treatment is based on the prolonged administration of drugs that block the intestinal absorption of copper, such as chelating agents (potassium sulfide, EDTA, D-penicillamine), cortisones (prednisone, 6-methylprednisolone), and antiparkinson drugs (L-dopa and amantadine combined with penicillamine). Copper-deficient diets are also employed as therapy.

5097 THE EFFECT OF LONG-TERM TREATMENT WITH d-PENICILLAMINE ON THE HUMORAL IMMUNE RESPONSE IN PATIENTS WITH WILSON'S DISEASE. (Eng.) Czlonkowska, A. (Inst. Psychoneurology, Warszawa, Poland). *Mater. Med. Pol.* 8(1):48-50; 1976.

The effects of long-term treatment with d-penicillamine on the synthesis of immunoglobulins (Ig) and antibodies to bacterial antigens were investigated in 21 patients with Wilson's disease. One group of 8 patients had been receiving d-penicillamine for 2 yr or more; the other 13 patients did not receive the drug. A radial immunodiffusion method was used to measure IgG, IgA, and IgM. Antibodies to common antigen (C.A.) of Enterobacteriaceae and O antigen of S-typhi were determined by a passive hemagglutination method. Long-term treatment with d-penicillamine resulted in a decreased serum IgA (111.31 ± 113.43 IU/ml). Patients receiving d-penicillamine had lower IgG and IgM levels than patients not receiving the drug ($p<0.05$). Long-term treatment with d-penicillamine also reduced the level of antibodies to C.A. and to antigen O of S-typhi. Thus, a fall occurs in the immune response of the humoral type. Penicillamine exerts a direct influence on immunocompetent cells, which inhibits the synthesis of antibodies.

5098 PORTAL CIRCULATION AFTER LONG-TERM D-PENICILLAMINE TREATMENT FOR LESIONS OF THE HEPATIC PARENCHYMA IN WILSON'S DISEASE. (Ger.) Seidlova, V.; Kuba, J. (Medizinische Fakultat, Palacky-Universitat, Olomouc, I. P. Pavlova 6, Czechoslovakia). *Dtsch. Z. Verdau. Stoffwechselkr.* 35(1):17-23; 1975.

Splenoportoscintography was performed on five patients with Wilson's disease to study portal circulation and the possible development of portal hypertension resulting from changes in liver cell tissue associated with this disease. The patients, aged 19-28 yr, had been treated with D-penicillamine (1 g/day) for an average of 10 yr. Cirrhosis of the liver was present in all cases. After D-penicillamine treatment, all patients improved clinically and biochemically. Splenomegaly subsided only temporarily. Esophageal varices were found in one patient at the onset of treatment and were present in three patients after 10 yr. Splenoportoscintography showed marked pathological changes in the portal circulation, indicating portosystemic shunts, in four of the five patients; in two patients, unusual intrahepatic shunts were observed. In one patient, a spontaneous anastomosis, similar to a mesocaval shunt, was present. Electroencephalographic examination revealed possible portosystemic encephalopathy in two cases. The authors conclude that the possibility of developing portal hypertension is very real in patients with Wilson's disease, despite the obvious improvement following treatment with D-penicillamine.

5099 THE VALUE OF HEPATO-PREST IN THE DIAGNOSIS AND FOLLOW-UP OF HEPATIC AFFECTIONS. (Fre.) Chevrel, B. (Hopital Saint-Antoine, 75012 Paris, France). *Med. Chir. Dig.* 4(4):256-258; 1975.

5100 USE OF IMMUNOLOGICAL INDICES IN THE DIAGNOSIS OF DISEASES OF THE HEPATOPANCREAS SYSTEM. (Rus.) Bordonos, V. G.; Reingardt, B. K.; Mal'tsev, V. N.; Khramov, A. V.; Svintsitskii, A. S. (Kiev Medical Inst., Kiev, USSR). *Klin. Khir.* (4):27-30; 1976.

5101 DIAGNOSTIC SIGNIFICANCE OF IMMUNOGLOBULIN DETERMINATION IN CHRONIC LIVER DISEASES: I. DIFFERENTIAL DIAGNOSTIC ACCURACY OF IMMUNOGLOBULIN CHANGES AND ENZYME ACTIVITIES. (Ger.) Ortmans, H.; Wildhirt, E.; Welcke, U.; Tucke, M. (Medizinische Klinik I, Stadtkrankenhaus, D-3500 Kassel, W. Germany). *Munch. Med. Wochenschr.* 117 (42):1681-1688; 1975.

5102 RESULTS OBTAINED WITH THE ADMINISTRATION OF DEHYDROEMETINE IN THE LUMEN OF THE HEPATIC ARTERY. PRELIMINARY NOTE. (Spa.) Stoopen, M.; De Stoopen, V. B.; Landa, L. (Hospital General del Centro Medico Nacional, I.M.S.S., Mexico). *Prensa Med. Mex.* 40(3/4):59-65; 1975.

5103 TEMPORARY HEPATIC INTERVENTION. V.--COMPARISON OF ISOLATED PORCINE LIVER PERFUSION WITH HOMOLOGOUS BLOOD AND HUMAN BLOOD. HEMODYNAMIC ASPECTS AND ACID-BASE BALANCE. (Por.) Mies, S.; Larsson, E. J.; Mittelstaedt, W.; Saez-Alquezar, A.; de Medeiros Torres, P.; Ohtsuki, N.; Caetano de Silva, L.; Raia, A.; Raia, S. (Unid. Figado, Hospital das Clinicas da FMUSP, Sao Paulo, Brazil). *Rev. Hosp. Clin. Fac. Med. Sao Paulo* 30(3):203-212; 1975.

5104 HEPATIC AND ANTIBIOTIC INTERACTION--ITS IMPORTANCE FOR THE TREATMENT OF HEPATOBILIARY DISEASES. (Por.) de Carvalho, I. (Clinica Cirurgica, Faculdade de Medicina de Sorocaba, Sorocaba, Sorocaba, Spain). *Folha Med.* 70(4):319-328; 1975.

5105 CURRENT VIEWS ON HEPATOPROTECTIVE THERAPY: CLINICAL ASSESSMENT OF 4-AMINO-5-CARBAMIDE IMIDAZOLE 2,4-DIHYDROXY-6-PYRIMIDINE CARBONATE. (Ita.) Tammaro, A. E.; Bonaccorso, O. (Cattedra di Gerontologia, Universita di Sassari, Viale Monte Nero, 11 20135 Milan, Italy). *Clin. Ter.* 75(2):141-151; 1975.

5106 CURRENT INTEREST OF DRUG THERAPY OF HEPATIC AND BILIARY DISEASES. (Ita.) Donatelli, L.; Marmo E. (Istituto di Farmacologia, Universita di Napoli, Naples, Italy). *Clin. Ter.* 76(6):495-513; 1976.

5107 HISTOLOGICAL AND ULTRASTRUCTURAL CHANGES IN THE LIVER RELATED TO PATHOLOGICAL STATES. (Rus.) Mossevich, T. N.; Lytkin, M. I.; Kalashnikov, S. A.; (Inst. Cytology, Acad. Sciences USSR, Leningrad, USSR). *Tsitologiia* 17(12)1357-1361; 1975.

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spital, CH-6004 Luzern, Switzerland). *Schweiz. Med. Wochenschr.* 105(47):1593; 1975.

5109 STUDY OF CERTAIN MEDIATORS AND ENZYMES IN DISEASES OF THE HEPATOBILIARY SYSTEM. (Rus.) Barba, E. I.; Vasiliuk, V. N.; Kushnir, V. S. (Ternopol Medical Inst., Ternopol, USSR). *Vrach. Delo* (4):110-113; 1976.

5110 NON-PARASITIC ABSCESS OF THE LIVER. (Fre.) Tricot, J. F. (Hopital Cochin, 75014 Paris, France). *Rev. Med. Etudes Med.* 17(3):127-128; 1976.

5111 DIAGNOSIS AND THERAPY OF HEPATIC ACTINOMYCOSIS. (Ger.) Clavadetscher, P.; Wegmann, T.; Graf, P.; Gloor, F. (Medizinische Klinik A, Kantonsspital, CH-9006 St. Gallen, Switzerland). *Scheiz. Med. Wochenschr.* 105(36):1147-1151; 1975.

5112 THE STUDY OF ISOENZMES OF ESTERASE, LACTATE DEHYDROGENASE AND ALKALINE PHOSPHATASE FROM BLOOD SERUM IN LYMPHOGRANULOMATOUS PROCESS OF LIVER TISSUE. (Rus.) Surinov, B. P.; Vakulenko, A. D. (Inst. Medical Radiology, Acad. Medical Sciences, Obninsk, USSR). *Vopr. Med. Khim.* 21(5):507-511; 1975.

5113 PRIMARY CARCINOMA OF THE LIVER AS "ACUTE ABDOMEN." (Dut.) Stroosma, O. C. (Onze Lieve Vrouwe Gasthuis, Amsterdam, Netherlands). *Ned. Tijdschr. Geneeskd.* 119(32):1237-1240; 1975.

5114 LIVER TUMORS. (Fre.) Chapuis, Y. (Hopital Cochin, Port-Royal, 75014 Paris, France). *Rev. Med. Etudes Med.* 17(3):121-124; 1976.

5115 CAVERNOUS HEMANGIOMA OF A SUPERNUMERARY HEPATIC LOBE. (Rus.) Avdey, L. V.; Vaskovskiy, G. D. (Minsk Medical Inst., Minsk, USSR). *Khirurgiia (Mosk.)* (10):137-139; 1975.

5116 RELAPSING INTRAHEPATIC CHOLESTASIS (SUMMERSKILL'S SYNDROME). (Rus.) Loginov, A. S.; Krel, P. E.; Yartseva, A. M. (Central Scientific Res. Inst. Gastroenterology, Moscow, USSR). *Klin. Med. (Mosk.)* 53(10):78-83; 1875.

5117 FUNCTIONAL CHANGES IN THE LIVER IN CUSHING'S DISEASE. (Rus.) Zlatkina, A. R.; Kamynina, T. S. (M. F. Vladimirskii Moscow Oblast Scientific Res. Inst. Clinic, Moscow, USSR). *Klin. Med. (Mosk.)* 53(8):23-27; 1975.

5118 ACUTE LIVER FAILURE: PRECOMA AND COMA. (Fle.) De Groote, J. (No affiliation given). *Tijdschr. Gastroenterol.* 18(2):119-122; 1975.

5119 CLASSIFICATION AND DIAGNOSIS OF JAUNDICES. (Fre.) Cachin, M. (Hopital Cochin, 75014 Paris, France). *Rev. Med. (Paris)* 17(7):409-416; 1976.

5120 PRIMARY CHRONIC ODDITIS. NOSOLOGICAL STUDY. (Fre.) Hureau, J.; Bourdais, J. P.; Lehn, E.; Delaviere, P. (Faculte de Medecine Necker, Enfants Malades, 75015 Paris, France). *Med. Chir. Dig.* 4(4):237-241; 1975.

5121 ORGAN PORPHYRINS IN TWO DIFFERENT FORMS OF PORPHYRIA. (Pol.) Zawirska, B. (Zaklad Anatomii Patologicznej Instytutu Biostruktury A.M., 50-368 Wroclaw, ul. Marcinkowskiego 1, Poland). *Acta Haematol. Pol.* 5(2):127-131; 1974.

5122 REYE'S SYNDROME: CLINICAL AND ULTRAMICROSCOPIC STUDY. (Spa.) Delgado, A.; Bernaola, E.; Molina, J.; Egues, J.; Hernandez, F.; Martinez Lage, M.; Pons, F. (Clinica Universita, Departmento de Pediatria, Apartado 192, Pamplona, Spain). *Rev. Esp. Pediatr.* 31(184):561-580; 1975.

5123 THERAPY OF FATTY DEGENERATION OF THE LIVER. (Ger.) Trux, F. (Medizinische Klinik, Medizinischen Akademie, 50 Erfurt, Nordhauser Strasse 74, E. Germany). *Z. Aerztl. Fortbild. (Jena)* 70(2):66-70; 1976.

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5125 COMMENTS ON INDICATIONS FOR TRANSPLANTATION OF THE LIVER. (Cze.) Horky, J.; Blahnikova, L.; Moravkova, J. (140 00 Praha 4-Krc, Budejovicka 800, Czechoslovakia). *Rozhl. Chir.* 54 (8):560-568; 1975.

5126 CURRENT PROBLEMS IN LIVER TRANSPLANTATION: OUR EXPERIENCE WITH SIX LIVER TRANSPLANTATIONS. (Ger.) Gutgemann, A.; Lie, T. S.; Kaufer, C.; Esser, G.; Schriefers, K. H.; Paquet, K. J.; Siedek, M. (Chirurgische Universitatsklinik, 53 Bonn 1, Venusberg, Germany). *Dtsch. Med. Wochenschr.* 100(40):2047-2052; 1975.

5127 HEPATIC TRAUMA: LITERATURE REVIEW. (Rus.) Makarenko, T. P.; Lipovan, V. G. (Central Inst. Postgraduate Medicine, Moscow, USSR). *Khirurgiia (Mosk.)* (7):116-120; 1975.

5128 SECONDARY COMPLICATIONS OF HEPATIC INJURIES: A REPORT OF 239 CASES. (Spa.) Torterolo, E.; Piacenza, G.; Bruno, G. R.; Casanello, G.; Castigloini, J. C.; Perrier, J. P.; De Vecchi, J.; Saccone, R. (Gral. Baldomir 2437, Monevideo, Uruguay). *Cir. Uruguay* 45(3):181-184; 1975.

See also, 4586, 4595, 4610, 4676, 4742, 4743, 4750, 4766, 4786, 4787, 4788, 4789, 4791, 4792, 4795, 4798, 4799, 4801, 4803, 4804, 4805, 4825, 4864, 4916, 4967, 4970, 4994, 5005, 5040, 5149, 5189, 5197, 5201, 5203, 5205, 5209, 5245, 5288, 5338, 5346, 5348.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

5129 BROMOSULFOPHTHALEIN EXCRETION AND HYPERBILIRUBINEMIA IN GILBERT'S DISEASE. (Ger.) Cartei, G.; Chisesi, T.; Cazzavillian, M.; Barbui, T.; Battista, R.; Dini, E. (Hamatologishe Abteilung, Stadtischen Krankenhauses, Vicenza, Italy). *Dtsch. Z. Verdau. Stoffwechselkr.* 35(4): 169-173; 1975.

The rate of BSP clearance and the relation between the unconjugated serum bilirubin level and the abnormalities in BSP metabolism were studied in 23 unrelated patients with Gilbert's disease. BSP (5 mg/kg, i.v.) was administered, and the transfer rates from plasma to liver, from liver to bile, and the return from liver to plasma were determined for a 90-min period. Compared to 50 controls, BSP transfer from plasma to liver was reduced in 95.6% of the patients (mean values 0.0944 ± 0.0026 and 0.1375 ± 0.0024 mg/mg/min, resp.) and for transfer from liver to bile in 91% (mean values 0.0348 ± 0.0017 and 0.0872 ± 0.0067 mg/mg/min, resp.). Transfer from liver to bile was slightly elevated (0.0078 ± 0.0001 compared to 0.0056 ± 0.0008 mg/mg/min). BSP retention after 45 min was elevated in 56% of the patients (mean value 3.59 ± 0.35 mg/mg/min as compared to 1.04 ± 0.19 mg/mg/min for controls). Technical failure of transfer had to be excluded, since transfer rates were irregular in different patients. Since BSP, as well as bilirubin uptake by the liver, are regulated by the Z and Y protein mechanism, a defect in this mechanism could explain the reduced liver BSP uptake. In 86.9% of the patients, two defects in transfer were present, i.e. in uptake by the liver and in transfer to the bile.

5130 THE TITRE OF IgG ANTI-A/B IN THE SERUM OF GROUP O MOTHERS OF INCOMPATIBLE INFANTS WITH EARLY NEONATAL JAUNDICE. (Eng.) Carapella-de Luca, E.; Pacioni, C.; Tonelli, C. (Istituto di Puericultura dell'Universita, Policlinico Umberto I, Roma, Italy). *Vox. Sang.* 30(3):200-203; 1976.

The titer of immunoglobulin G (IgG) anti-A/B was determined in the sera of 80 blood group O mothers, who gave birth at term to A/B incompatible infants. The infants developed early neonatal jaundice with a serum bilirubin level of over 10 mg/100 ml. The titers were determined using a 2-mercaptoethanol test and were compared with the results of the direct antiglobulin test performed on the RBC from the cord blood and the necessity for exchange transfusion. The IgG anti-A/B titers ranged between 1/8 and 1/4,096. In mothers of group A infants, a significant correlation was found between the titer of IgG anti-A and the occurrence of a positive antiglobulin test. The need for an exchange transfusion was not correlated with the IgG anti-A/B titer.

5131 CHOLESTATIC JAUNDICE IN NEWBORN BABIES AND IN INFANTS. (Fre.) Castel, Y.; Lejeune, B. (Service de Pediatrie et Genetique Medicale, C.H.R., Brest, France). *Ouest Med.* 29(3):149-157; 1976.

5132 MORPHOLOGICAL ASPECTS CONCERNING A HEPATOGENIC CONCEPTION OF THE HYPERBILIRUBINEMIA. (Ger.) Bluger, A. F.; Kartaschova, O. J. (Riga Medical Inst., Bulvar Padomju 12, Riga, USSR). *Zentralbl. Allg. Pathol.* 119(4):259-267; 1975.

5133 TREATMENT OF NEONATAL HYPERBILIRUBINEMIA WITH URIDINE DIPHOSPHOGLUCOSE (U.D.P.G.) (Spa.) Jorro Molto, F.; Maset Maedonado, J. (Residencia Sanitaria "General Sanjurjo," Seguridad Social, Valencia, Spain). *Rev. Esp. Pediatr.* 31 (183):407-418; 1975.

5134 MECHANISM OF DISORDERS OF LIVER FUNCTION WITH INCREASED BILIRUBIN CONTENT IN THE BLOOD. (Rus.) Ivanov, A. Ya.; Susla, P. A. (Leningrad Inst. Medicine and Hygiene, Leningrad, USSR). *Klin. Med. (Mosk.)* 53(10):86-90; 1975.

See also, 5119, 5157.

Nonviral Hepatitis and Hepatic Injury

5135 MORPHOLOGY OF DRUG-INDUCED LESIONS OF THE LIVER. (Ger.) Hubner, K. (Senckenbergischen Zentrum d. Pathologie d. Univ., 6000 Frankfurt a. M. 70, Theodor-Stern-Kai 7, W. Germany). *Therapiewoche* 26(5):590-604; 1976.

Drug-induced liver damage constitutes a large portion of all liver diseases. Some drugs always have a toxic effect, whereas others are hepatotoxic only in certain patients. Liver damage can be the result of changes in the liver cell cytoplasm, inflammation, or destruction of the liver cells. Cytoplasmic changes, leading to hyperplasia of the smooth endoplasmic reticulum, are the result of chronic use of, among others, analgesics, barbiturates, or some tuberculostatic drugs. Fatty degeneration of the liver, also caused through cytoplasmic changes and leading to liver failure and death, can occur after large doses of tetracycline. Cortisone therapy can also induce fatty liver. Phenacetin often leads to lipofuscinosis. Anabolic agents, steroids, and many oral contraceptives can cause intrahepatic cholestasis, sometimes associated with liver cell necrosis and inflammatory changes, which may also be seen after the use of chlorpromazine, some antiepileptic, antidepressive, antibiotic, cytostatic, or laxative drugs. Liver disease similar to viral hepatitis is seen after the use of the fluorinated agent halothane and is even more common after repeated exposure. Chronic aggressive hepatitis, sometimes leading to cirrhosis, can be caused by laxative agents containing phenolosatin. The degree of liver cell necrosis caused by tuberculostatic drugs, is dependent on the duration of the medication.

5136 LIVER DAMAGE CAUSED BY LAXATIVES: A CONTRIBUTION TO THE HEPATOTOXICITY OF 4,4'-(2-QUINOLYLMETHYLENE)DIPHENYL-HYDROCHLORIDE. (Ger.) Wiegelmann, W.; Borchard, F.; Irmscher, K. (Medizinische Klinik der Universitat, 4 Dusseldorf, Moorenstr. 5, W. Germany). *Arzneim. Forsch.* 25(6):949-951; 1975.

A case of liver cell damage with intrahepatic cholestasis caused by 4,4'-(2-quinolylmethylene)diphenyl-hydrochloride (CDH) is described. The patient, a 46-yr-old woman, had been using laxatives for years. After six weeks of intermittent use of CDH, colic-like pains developed, and blood chemistry revealed hyperbilirubinemia, elevated GOT, GPT, alkaline phosphatase, and γ-GPT. After renewed exposure to the laxative agent, clinical symptoms appeared after 3-4 hr; biochemical changes were evident 9 hr later. Histologic damage of the bile ducts and scattered liver cell necrosis, plus marked depression of bilirubin secretion, were present in the acute phase of the disease. Antibodies against liver tissue antigens were identified, suggesting that an immunological reaction had caused the reversible liver damage through a hypersensitivity reaction to CDH.

5137 ALLOPURINOL-INDUCED GRANULOMATOUS HEPATITIS. (Eng.) Espiritu, C. R.; Alalu, J.; Glueckauf, L. G.; Lubin, J. (Mount Sinai Medical Center, Miami Beach, FL). *Am. J. Dig. Dis.* 21(9):804-806; 1976.

A second documented case of granulomatous hepatitis occurring in a 55-yr-old woman after therapy with allopurinol is reported. Four weeks after beginning treatment with allopurinol for hyperuricemia, the patient developed arthralgia, myalgia, and fever. A percutaneous liver biopsy showed the presence of small granulomas scattered throughout the hepatic lobules, but sparing portal tracts. The granulomas showed no necrosis and were composed mainly of mononuclear and multinucleated histiocytes and a few lymphocytes. There were a few scattered eosinophilic granulocytes in portal tracts and sinusoids. Shortly after allopurinol was discontinued, there was dramatic clinical improvement; liver function returned to normal, except for a persistently elevated alkaline phosphatase level (130 μU/ml). Open liver biopsy performed 9 months after cessation of allopurinol therapy demonstrated complete resolution of the granulomatous infiltrates in the liver. This case differs from the previously reported case by the absence of peripheral eosinophilia, the slow resolution of liver dysfunction, and the predominantly lobular distribution of the granulomas with sparing of the portal tracts. The persistent elevation of the alkaline phosphatase may be explained by the remaining fatty infiltration, which was seen on the repeat liver biopsy.

5138 SUBACUTE TOXIC HEPATITIS FOLLOWING TREATMENT WITH PERHEXILINE MALEATE. (Fre.) Pelletier, M.; Lambert, R.; Paliard, P.; Bory, R. (Hopital E. Herriot, place d'Arsonval, F 69374 Lyon Cedex 2, France). *Nouv. Presse Med.* 5(16):1070; 1976.

5139 A CASE OF ISOLATED NECROSING HEPATIC GRANULOMATOSIS WITH Brucella melitensis INFECTION: DIAGNOSTIC PROBLEMS AND THE PLACE OF SURGICAL MANAGEMENT. (Fre.) Dupont, V. V.; Bismuth, H.; Vachon, F.; Lagarde, P.; Vernant, D.; Mignon, E. (Hopital Claude-Barnard, 10, avenue de la Porte-d'Aubervilliers, F 75019 Paris, France). *Ann. Med. Interne (Paris)* 127(3):253-257; 1976.

5140 HEPATITIS DUE TO Salmonella. (Spa.) Zacarias, J.; Brink, P. (Hospital Calvo Mackenna, Santiago, Chile). *Rev. Chil. Pediatr.* 45(1):35-40; 1974.

See also, 5092, 5094.

Acute Viral Hepatitis

5141 GLUCOSE TOLERANCE IN VIRAL HEPATITIS.

(Eng.) McIlroy, M.; Walsh, C. H.; Doyle, C.; O'Sullivan, D. J.; Whelton, M. J. (St. Finbarr's Hosp., Cork, Ireland). *Ir. J. Med. Sci.* 145(1):3-9; 1976.

The incidence and type of abnormalities of glucose homeostasis that may occur in viral hepatitis were investigated in 14 patients with confirmed viral hepatitis. Oral glucose tolerance tests (50 g glucose) were performed on all patients. All patients were jaundiced, with serum bilirubin ranging from 1.2 to 16.0 mg. SGPT was raised in all patients, ranging from 288 to 2,180 IU/l. The prothrombin index was initially increased in three patients, but returned to normal after intramuscular vitamin K treatment. Five patients had abnormal glucose tolerance tests. Two of these had an impaired insulin response to the oral glucose load. Glucose tolerance tests repeated in the anicteric phase gave normal results. The differences were significant at 30 ($p<0.02$), 60 ($p<0.001$), 90 ($p<0.01$), and 120 ($p<0.05$) min. Serum insulin levels also showed an improved response in the anicteric phase. Eight of the 14 patients had no abnormality of either blood sugar or serum insulin after oral glucose loading. There was no significant difference in the mean bilirubin, SGPT, or alkaline phosphatase levels, or prothrombin time between patients with abnormal and normal glucose tolerance. The lowest fasting blood sugar was 55 mg, recorded on a single occasion in each of five patients. The glycogen content was assessed on a subjective, visual scoring system in 10 of the 13 patients who underwent liver biopsy. It was decreased in all specimens. The glycogen scores of the patients with hepatitis were just significantly lower than those of 10 patients with other forms of liver disease studied at the same time ($p<0.05$). It is concluded that the deranged carbohydrate metabolism probably reflects a combination of stress and viral infection.

5142 FREQUENCY OF HEPATITIS IN SPECIALISTS IN ONTARIO.

(Eng.) Berris, B.; Feinman, S. V.; Sinclair, J. C.; Wrobel, D. M.; Carr, A.; Christopher, J.; Le Riche, W. H. (Suite 427, 600 University Ave., Toronto, Ontario, M5G 1X5, Canada). *Can. J. Public Health* 66(6):468-470, 1975.

The frequency of hepatitis among 4,426 physicians in Ontario was determined by questionnaire. The 574 surgeons had a higher frequency of hepatitis (12.2%) than did the 1,491 family physicians (8.9%), 141 radiologists (5.0%), and the 238 psychiatrists (5.8%), but a similar frequency to the 602 internists (10.0%), the 165 obstetricians (9.7%), the 159 pediatricians (8.8%), and the 119 pathologists (9.2%). Although epidemics of hepatitis B in some hospital areas, such as laboratory, dialysis, and operating rooms, have been described, routine preferential hepatitis B surface antigen screening of patients in selected services is not indicated.

5143 CARRIERS OF HEPATITIS B ANTIGEN AND INFECTIVITY.

(Swe.) Nordenfelt, E. (Institutionen for medicinsk mikrobiologi, Lund, Sweden). *Lakartidningen* 72(37):3411-3412; 1975.

The detection of hepatitis B antigen (HBsAg) alone does not indicate that the carrier represents a source of infection. Approximately 0.1% of apparently healthy blood donors in Sweden are chronic carriers of HBsAg. The hepatitis B virus has not been isolated, but may be contained in the so-called Dane particles. These particles contain distinct surface and core HBAg, and DNA-polymerase activity has been associated with the HBcAg of the particles. A recently discovered antigen, the e antigen, has been associated with HB virus activity, and therefore may serve as an indicator of infectivity. Coded blood sera from six donors and from six dialysis patients with highly infectious hepatitis B were clearly distinguishable, since the latter always displayed Dane particles, e antigen, or DNA polymerase (generally all three), while all but one of the former patients had, at most, a few Dane particles. The suspect donor had a history of liver disorders, and his wife subsequently developed HB. Twenty-three of 36 chronic HBsAg carriers in an institution for the mentally retarded were positive for DNA polymerase; 1 of these was also positive for e antigen, while 11 were negative. Nine of the 11 patients without DNA polymerase and e antigen showed no signs of liver damage, but 21 of the 23 patients who were positive for DNA polymerase had biochemical signs of chronic hepatitis. It seems that testing for e antigen and DNA polymerase can distinguish infectious HBAg carriers.

5144 BACKGROUND AND PRACTICAL ASPECTS OF HEPATITIS B SURFACE ANTIGEN CARRIER STATE.

(Eng.) Helske, T. (Finnish Red Cross Blood Transfusion Service, Kivihaantie 7, SF-00310 Helsinki 31, Finland). *Ann. Clin. Res.* 8(3):158-161; 1976.

The literature on the incidence of the hepatitis B surface antigen (HBsAg) carrier state and on the relationship of this state to the development of acute hepatitis is briefly reviewed, and practical measures concerning the management of carriers are discussed. The prevalence of carriers is lowest (0.1-0.2%) in Western Europe and North America, and highest (a few percent) in Oceania and Asia. The carriers are frequently young males, and the prevalence of carriers among drug addicts, prisoners, prostitutes, and patients at venereal disease clinics is higher (0.7-5.0%) than among other groups. In one study in Finland, only 8 of 583 HBsAg-positive blood donors had evidence of chronic hepatitis. However, acute hepatitis B followed by persistent HBs antigenemia usually progresses to chronic hepatitis. Familial clustering of HBsAg carriers has been described in populations with a high prevalence of carriers, such as the Pacific Ocean and on Sardinia, and also in populations with fewer carriers

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in Finland and New York; the frequency of carriers among the relatives of index cases was 7.9% in New York and 9.6% in Finland, i.e., 10 and 50 times as high as in their general populations. A combination of environmental and genetic factors are thought to contribute to the chronic HBsAg carrier state, but the genetic factors are poorly understood. The relatives of a patient with acute hepatitis B often develop the disease, but in relatives of healthy HBsAg carriers, acute hepatitis is an exception; of 184 spouses of Finnish HBsAg carriers, only 3 developed hepatitis. Although there are 7,000-8,000 HBsAg carriers in Finland, only 114 cases of acute hepatitis were reported in 1973. It is concluded that strict occupational or social restriction of HBsAg carriers is unnecessary, except among those involved in the preparation of blood products and among blood donors.

5145 EFFECTIVENESS OF THE FLAVONOID (+)-CYANIDANOL-3 IN ACUTE VIRAL HEPATITIS. (Ger.)

Borel, G. A.; Schelling, J. L.; Magnenat, P. (Kanton-Hospitals, Universitat Lausanne, 47, Av. des Cerisiers, CH-1009 Pully, Switzerland). *Z. Gastroenterol.* 14(1):24-29; 1976.

The clinical effect of (+)-cyanidanol-3, a flavonoid with very little toxicity, was tested in 28 young patients with acute viral hepatitis in a double-blind study. The clinical diagnosis was verified by laboratory tests. Fourteen patients received 1 g of (+)-cyanidanol-3 for 2 days, then 2 g daily for an average of 21 days; the other 14 patients were given lactose placebo tablets. In another study (without controls and a double-blind trial), 18 patients received only 1 g (+)-cyanidanol-3 daily. The results indicated no statistically significant difference in symptoms between the groups. The regression of the hyperbilirubinemia in relation to time from its maximum value to its first normal value (1.2 mg/100 ml) revealed half times of 3.2 ± 0.5 days in treated patients and 4.9 ± 0.5 days in untreated ones ($p<0.05$). There was no statistical difference between the placebo group and the patients of the second study; the dosage of the second study was assumed to be too low to be effective. No other liver function tests showed statistically significant differences between the groups. The effectiveness of at least 2 g of (+)-cyanidanol-3 a day on the plasma bilirubin level in acute viral hepatitis has been confirmed by two other double-blind studies.

5146 EFFECT OF HUMAN LEUKOCYTE INTERFERON ON HEPATITIS B VIRUS INFECTION IN PATIENTS WITH CHRONIC ACTIVE HEPATITIS. (Eng.)

Greenberg, H. B.; Pollard, R. B.; Lutwick, L. I.; Gregory, P. B.; Robinson, W. S.; Merigan, T. C. (Stanford Univ. Sch. Medicine, Stanford, CA 94305). *N. Engl. J. Med.* 295(10):517-522; 1976.

The effects of human WBC interferon on specific Dane-particle markers were studied in four patients with chronic hepatitis B infection and chronic active hepatitis. Three patients had consistently elevated levels of circulating Dane-particle markers, including Dane-particle-associated DNA polymerase activity, hepatitis B core antigen, and Dane-particle-associated DNA. Parenteral (s.c., once daily in 3 patients; i.m., twice daily in 1) interferon (6.0×10^3-17×10^4 U/kg/day) administration was associated with a rapid and reproducible fall in all Dane-particle markers in the three patients. The suppressive effect was transient when the interferon was given for 10 days or less, but appeared to be more permanent when administration was prolonged for a month or more. In addition, long-term interferon therapy was associated with a marked fall in hepatitis B surface antigen in two of three patients and a disappearance of e antigen in two of two patients. In the patient without Dane-particle markers, the levels of DNA polymerase activity, hepatitis B core antigen, and Dane-particle-associated DNA remained the same throughout the study. Interferon may be useful in limiting carrier infectivity or eradicating chronic infection.

5147 PROGNOSTIC SIGNIFICANCE OF IN-VITRO COMPLEMENT FIXATION IN LIVER BIOPSY SPECIMENS FROM PATIENTS WITH ACUTE VIRAL HEPATITIS TYPE B.

(Eng.) Rizzetto, M.; Diana, S.; Bonino, F.; Verme, G. (Ospedale Mauriziano Umberto I, Corso Turati 46, 10128 Turin, Italy). *Lancet* 2(7983):436-438; 1976.

The prognostic significance of *in vitro* complement fixation (VCF) by hepatitis B core antigen/antibody immunocomplexes in hepatitis B surface antigen (HBsAg)-positive liver biopsy specimens was evaluated in 47 patients with acute viral hepatitis B. Thirty-four of 37 VCF-negative patients made an uneventful recovery and became HBsAg-negative; in 10 patients with a VCF-positive test, chronic hepatitis and persistent antigenemia developed. The VCF test is a simple and reliable prognostic indicator of persistent infection and of progression of apparently acute hepatitis to a chronic liver disorder.

5148 DEFECT OF BONE MARROW GRANULOCYTE RESERVE IN VIRAL HEPATITIS. (Eng.)

Magliulo, E.; Gallina, M.; Scevola, D.; Concia, E. (Istituto di Malattie Infettive, Universita di Pavia, Pavia, Italy). *Acta Haematol. (Basel)* 54(1):27-31; 1975.

To elucidate the pathogenesis of bone marrow failure following viral hepatitis, the etiocholanolone test for marrow granulocyte reserve was used in 16 patients with hepatitis B antigen (HBAg)-positive hepatitis and 10 patients with HBAg-negative hepatitis. Peripheral WBC counts were carried out immediately before, and 9, 12, and 15 hr after the administration of etiocholanolone (0.2 mg/kg, i.m.). The height of the WBC response was evaluated in relation to the granulocytic increment (ΔG), the difference between the preinjection value and the maximum absolute granulocyte count obtained after the injection. ΔG was considered normal when the increase in granulocytes was higher than 2,600/μl after the injection. The average ΔG of the patients during the acute phase of the disease (3.456 granulocytes/μl) and during remission (5.407 granulocytes/

µl) was significantly lower than that of 10 controls (8.675 granulocytes/µl). Three of 8 patients in the acute phase of the disease had pathologically low ΔG values, and 1 of 18 patients had a low ΔG at release from the hospital; no pathological values were found in the controls. The mean ΔG of the HBAg-positive patients in the acute phase (2.970 granulocytes/µl) and in remission (5.302 granulocytes/µl) was lower than that of the HBAg-negative patients (4.265 and 5.571 granulocytes/µl in the acute and remission phases, resp.). The results indicate that the granulocyte response is impaired in many patients with hepatitis; this impairment may be caused by a virus-induced myelotoxic or immunoallergic derangement in the process of differentiation, proliferation, or maturation of granulocyte precursors.

5149 PRIMARY LIVER CANCER AND HEPATITIS B INFECTION IN SENEGAL. COMPARISON OF CANCER PATIENTS WITH TWO CONTROL GROUPS. (Fre.) Michon, J.; Prince, A. M.; Szmuness, W.; Demaille, J.; Diebolt, G.; Linhard, J.; Quenum, C.; Sankale, M. (Clinique Medicale, Faculte de Medecine, Dakar, Senegal). *Biomedicine* 23(7):263-266; 1975.

To determine the prevalence of hepatitis B surface antigen (HBsAg) and antibody (anti-HBs) in primary liver cancer (PLC), 165 patients with PLC, 154 age- and sex-matched controls with other cancers (COC), and 328 controls without cancer (CWC) were examined by radioimmunoassay and passive hemagglutination. The antigen was found in 61.2% of PLC, 11.7% of COC, and 11.3% of CWC. Anti-HBs was found in 18.2% PLC, 45.4% COC, and 42.1% CWC. In PLC patients, the frequency of HBsAg was significantly greater in those with positive α-fetoprotein (72.2%) than in those without it (40.3%). In view of the very early age for viral contamination in Senegal (maximal antigenemia at 5-6 yr), the HB infection probably precedes the hepatoma. The hepatoma may be the result of a direct oncogenic action of the virus. However, other factors such as hormones (predominance of men), pathological background (viral, bacterial, and parasitic infections), and nutritional state of health are probably also involved.

5150 COXSACKIE HEPATITIS IN AN ADULT, WITH ULTRASTRUCTURAL DEMONSTRATION OF THE VIRUS. (Eng.) Gregor, G. R.; Geller, S.; Walker, G. F; Campomanes, B. A. (Mount Sinai Hosp., Dept. Pathology, 100th St. and Fifth Ave., New York, NY 10029). *Mt. Sinai J. Med. N.Y.* 42(6):575-580; 1975.

The case of a 28-yr-old man with Coxsackie B virus infection, myocarditis, pericarditis, and myositis is reported. Rising serologic titers to Coxsackie B, types 2 and 5, were documented; the antibody titers to Coxsackie B2 were 1:256, 1:512, and 1:1024 on days 6, 13, and 27, resp., and to Coxsackie B5 were, resp., 1:32, 1:128, and 1:128. The clinical course was complicated by hepatitis, which was fatal. Liver biopsy prior to clinically obvious hepatitis showed microabscesses. At autopsy, inflammation was present in the heart, striated muscles, and liver. The hepatic tissue obtained at the time of biopsy, when serologic titers to Coxsackie virus were at a peak, was reprocessed for electron microscopy. Particles, identical to those previously documented as Coxsackie virus, were abundant in the liver cells.

5151 CLINICAL PATHOLOGIC CORRELATION IN VIRAL HEPATITIS: THE EFFECT OF THE VIRUS ON THE LIVER. (Eng.) Popper, H. (Mount Sinai Sch. Medicine, City Univ., New York, NY 10029). *Am. J. Pathol.* 81(3):609-628; 1975.

The clinical pathologic correlations in viral hepatitis are reviewed. With acute hepatitis, correlation with clinical features and functional defects is good. This is less true in chronic hepatitis. The pathology of hepatitis, including cell necrosis, fibrosis, cirrhosis formation, and inflammation is understood well enough to be useful in prognosis and monitoring of the disease during therapy. While still preliminary, the localization of the components of the hepatitis B antigen and their effects, including the nature of the immune response, may soon lead to further clarification of the pathogenesis and evolution of viral hepatitis.

5152 WAYS OF TRANSMISSION OF SERUM HEPATITIS IN CHILDREN. (Rus.) Petrunin, Yu. P.; Nechaeva, T. A.; Strekalova, M. A. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Vopr. Okhr. Materin. Det.* 20(9):27-30; 1975.

5153 COMBINED SPLENIN AND DELAGIL TREATMENT OF BOTKIN'S DISEASE. (Rus.) Kravchenko, I. A.; Kishko, A. M. (Dept. Infectious Diseases, Uzhgorod Univ., Uzhgorod, USSR). *Vrach. Delo* (2): 123-125; 1976.

5154 PREVENTION OF REMOTE SEQUELAE OF BOTKIN'S DISEASE (INFECTIOUS HEPATITIS). (Rus.) Petlitsky, S. I. (Grodno Medical Inst., Grodno, USSR). *Klin. Med. (Mosk.)* 53(10):136-139; 1975.

5155 CONDITION OF THE BILE TRACTS IN CHILDREN DURING AND AFTER BOTKIN'S DISEASE. (Rus.) Zaitseva, R. V.; Isaeva, L. A.; Mushkina, E. M. (Leningrad Medical Inst. Pediatrics, Leningrad, USSR). *Vopr. Okhr. Materin. Det.* 20(9):30-33; 1975.

5156 VITAMIN A AND CAROTENE CONTENT IN THE BLOOD SERUM IN THE DYNAMICS OF INFECTIOUS HEPATITIS (BOTKIN'S DISEASE). (Rus.) Golyana, V. I.; Kishko, A. M.; Kravchenko, I. A. (Dept. Infectious Diseases, Uzhgorod Univ., Uzhgorod, USSR). *Ter. Arkh.* 47:20-22; 1975.

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5157 PATHOGENESIS OF HYPERBILIRUBINEMIA IN CHILDREN WITH VIRAL HEPATITIS. (Rus.) Nisevich, N. I.; Spasibko, A. M. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Vopr. Okhr. Materin. Det.* 20(9):24-27; 1975.

5158 FAVORABLE OUTCOME OF A CASE OF VIRAL HEPATITIS COMPLICATED WITH HEPATIC COMA. (Bul.) Kirov, Iv.; Radev, M.; Todorov, M.; Vurbanov, V.; Petrova, M.; Aleksieva, M.; Kolarska, R. (TsZPB, Dept. Infectious Diseases Tropical Medicine, Bulgaria). *Suvrem. Med.* 26(7):41-43; 1975.

5159 IMMUNE COMPLEXES AND HEPATOPATHY. (Ita.) Pisi, E. (Istituto di Clinica Medica Generale e Terapia Medica, Universita di Bologna, Bologna, Italy). *Arch. Ital. Mal. Appar. Dig.* 37 (3):133-140; 1975.

5160 IMMUNOFLUORESCENCE AND ELECTRON MICROSCOPIC FINDINGS IN VIRAL HEPATITIS. (Ger.) Gudat, F.; Bianchi, L. (Institut fur Pathologie, Universitat Basel, Basel, Switzerland). *Verh. Dtsch. Ges. Pathol.* 58:519; 1974.

5161 DIFFICULTIES IN THE RECOGNITION AND DIFFERENTIAL DIAGNOSIS OF CHRONIC ACTIVE HEPATITIS. (Rus.) Tareev, E. M.; Aprosina, Z. G. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Ter. Arkh.* 47(10):25-33; 1975.

5162 DETECTION OF THE HB ANTIGEN IN PREPARATIONS OBTAINED FROM BLOOD. (Pol.) Poszwinski, P.; Bragiel, I.; Kacperska, E. (Instytut Hematologii, 00-957 Warsaw, ul. Chocimska 5, Poland). *Acta Haematol. Pol.* 4(2):133-136; 1974.

5163 REFLECTIONS ON THE TREATMENT OF VIRAL HEPATITIS. (Fre.) Traissac, F.-J.; Paccalin, J. (No affiliation given). *Bordeaux Med.* 8(9):1023-1029; 1975.

5164 SOME PROBLEMS OF PROPHYLAXIS OF VIRAL SERUM HEPATITIS. (Rus.) Khazanov, A. I.; Polyakova, I. I. (No affiliation given). *Klin. Med. (Mosk.)* 53(10):134-136; 1975.

5165 INVESTIGATION OF AN OUTBREAK OF HEPATITIS IN AN URBAN CENTER (TALCAHUANO, CHILE). (Spa.) Seelmann, G. E.; Carrasco, M. S.; Alliaga, D.; Bustos, E.; Figueroa, M. (Hospital Higueras, Talcahuano, Chile). *Rev. Chil. Pediatr.* 45(1):71-77; 1974.

5166 CLINICAL COURSE OF VIRAL HEPATITIS IN SCHOOL CHILDREN VACCINATED OR NOT WITH GAMMA-GLOBULIN. (Rus.) Podsedlovskiy, T. S.; Gruodite, S. N. (Lithuanian SSR Ministry Health, USSR). *Pediatriia* (6):37; 1975.

5167 B-TYPE HEPATITIS ANTIGEN FREQUENCY AMONG HEALTHY POPULATIONS IN VENEZUELA. (Spa.) Merino, F.; Tapia, T.; Arends, T. (Instituto Venezolano de Investigaciones Cientificas, Caracas, Venezuela). *Sangre* 20(2):121-126; 1975.

5168 IMMUNOCHEMICAL IDENTIFICATION OF TISSULAR β-GLOBULIN IN THE BLOOD SERUM OF PATIENTS WITH VIRAL HEPATITIS. (Rus.) Krivonosov, S. K.; Bogomolov, B. P.; Tatarinov, Yu. S.; Terentiev, A. A. (Second Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (5):96-98; 1975.

5169 THE GLUCURONIC ACID CONTENT IN THE BLOOD AND URINE OF HEALTHY CHILDREN AND IN THOSE INFECTED WITH VIRAL HEPATITIS. (Rus.) Andronova, V. V. (Saratov Medical Inst., Saratov, USSR). *Vopr. Okhr. Materin. Det.* 20(9):34-37; 1975.

5170 CLINICAL AND EPIDEMIOLOGICAL RELEVANCE OF THE D AND Y SUBTYPES OF HEPATITIS B SURFACE ANTIGEN. (Ger.) Thamer, G.; Kommerell, B. (No affiliation given). *Z. Gastroenterol.* 14:264; 1976.

5171 HEXOKINASE ACTIVITY OF THE BLOOD SERUM IN CHILDREN WITH VIRAL HEPATITIS. (Rus.) Bolobonkin, V. G.; Mil'man, M. Sh.; Uzbekova, Kh. Z. (Uzbek Scientific Res. Inst. Pediatrics, Tashkent, USSR). *Pediatriia* (6):47-48; 1975.

5172 AUSTRALIA ANTIGEN AND BLOOD TRANSFUSION: STUDY OF CERTAIN ASPECTS. (Por.) Prates, O. P.; Gomes, M. L. L. (Hospital de S. Jose, Lisbon, Portugal). *Bol. Clin. Hosp. Civis Lisb.* 35(1/4):3-48; 1973/1974.

See also, 5088, 5179, 5185, 5205, 5249.

Chronic Hepatitis

5173 CHRONIC HEPATITIS: PRACTICAL GUIDELINES FOR DIAGNOSIS AND TREATMENT. (Dut.) Vogten, A. J. M.; Brandt, K.-H.; Bronkhorst, F. B. (Afdeling Gastro-Enterologie, Academisch Ziekenhuis te Utrecht, Utrecht, Netherlands). *Ned. Tijdschr. Geneeskd.* 119(33):1277-1282; 1975.

Because of the multiplicity of possible manifestations, chronic hepatitis is extremely difficult to define and differentiate from other diseases. In chronic persistent hepatitis, inflammatory infiltrate, consisting primarily of mononuclear cells, is present in the portal vessels; in chronic aggressive hepatitis, the inflammatory process is not limited to the portal vessels, but the parenchyma is also involved. Anamnestic factors discovered in a retrospective survey of 80 chronic hepatitis patients included pathological fatigue in 69, icterus in 40, abdominal pain in 40, presumed virus exposure in 33, itching in 20, hepatotoxic drug use in 9, fever or subfebrile temperature in 6, menstruation disorders in 5 of 52 women, and malfunction of organs other than the liver in 18. The following findings were obtained in general physical examinations of these 80 patients: liver enlargement in 33, palpable spleen in 23, spider nevi in 19, palmar erythema in 10, ascites in 9, and rectal varices in 7. Some chronic hepatitis patients with hepatitis B antigen in the serum may benefit from immunosuppressive treatment; in others, only careful monitoring is indicated. Treatment of patients with a hyperimmune type illness should begin with 2-4 weeks of strict bed rest, followed by the minimum dose of prednisone necessary to suppress disease activity. Preventing cirrhosis development is of major importance.

5174 PROGNOSIS OF CHRONIC HEPATITIS. (Eng.) Krieg, D.; Weigl, E.; Bach, H. (Hospital Eisenhuttenstadt, DDR-1220, Eisenhuttenstadt, E. Germany). *Acta Hepatogastroenterol.* 23(3):168-172; 1976.

The chronic diseases occurring in patients who had had hepatitis were investigated in 1,419 cases of acute viral hepatitis. These cases occurred during a 10-yr period among 66,211 residents of a rural district in Germany. Of the 1,283 patients who were followed up, 1,079 had completely recovered after 18 months. Of the remaining patients, chronic persistent hepatitis developed in 80, chronic aggressive hepatitis in 4, cirrhosis in 6, hyperbilirubinemia in 66, fatty liver in 3, and alcoholic liver in 9 patients. Defective states after hepatitis occurred in 28 patients, and undiagnosed pathologic cases were recorded in 8 patients. The transition to chronic hepatitis occurred more frequently in older patients; chronic hepatitis occurred in less than 1% of the preschool-aged children, in 10% of the young adults, and in 14% of the middle-aged adults. Forty-five patients with chronic persistent hepatitis recovered within 5 yr. Two of four patients with chronic aggressive hepatitis developed cirrhosis. Patients with viral hepatitis should be followed up to diagnose the chronic sequelae and to control the severe cases.

5175 SALIVARY AND DUODENAL AMYLASE PRODUCTION IN PATIENTS WITH CHRONIC HEPATIC DISEASES. (Ger.) Gladisch, R.; Maiwald, L. (Medizinische Klinik der Universitat Wurzburg, Luitpoldkrankenhaus, Josef-Schneider-Strasse 2, 8700 Wurzburg, W. Germany). *Med. Klin.* 71(9):373-377; 1976.

A generally symmetrical swelling of the parotid glands is sometimes seen in patients with chronic liver disease, but the cause has not yet been determined. Disturbances of excretory pancreas function are also common in liver disease. In view of the similarities of neural regulation of these two symptoms, amylase secretion was examined in 35 patients with various liver diseases, resulting in BSP retention levels of 0-5% (group 1), 5-10% (group 2), or more than 10% (group 3). Duodenal fluid and saliva were collected simultaneously for 60 min following infusion of pancreozymin (100 U) and secretin (90 U). The majority (8/13) of patients in group 1 had normal duodenal secretion volumes. In group 2, 80% of the patients had high normal secretion or hypersecretion levels. Six of the seven patients in group 3 had distinctly reduced (subnormal or low normal) secretion values. The changes in saliva production were the inverse of the changes in pancreatic secretion in the three groups; the largest saliva volumes were collected from group 3. The amylase production in each case paralleled the volume of secretion, and amylase production by the parotids increased with declining secretion by the pancreas. Some of the patients in group 2 deviated from this overall pattern. The findings support the association of liver and pancreatic abnormalities and confirm the increase in saliva production with progressive pancreatic insufficiency probably via hormonal mechanisms.

5176 DISORDERS OF CARBOHYDRATE METABOLISM IN CHRONIC HEPATITIS AND CIRRHOSIS OF THE LIVER. (Slo.) Danko, M.; Spanar, E.; Holan, J.; Zahradny, V.; Kurocka, J. (LF UK, ul. Vychodna 2-14, Sever, Martin 1, 036 01 Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(3):173-177; 1974.

Glucose tolerance and the role of endogenous plasma insulin were investigated in patients with disorders of carbohydrate metabolism, chronic hepatitis, and cirrhosis. Sixty and 120 min after glucose administration (0.5 g/kg, i.v.), the blood sugar level was significantly increased in 10 patients with chronic hepatitis and cirrhosis over 11 controls. The slope of the blood sugar level curve was also pathologically altered in the patients, while the glucose utilization coefficient was significantly lowered ($p<0.05$) in 70% of them. The plasma level of total immunoreactive insulin was significantly increased during fasting and 120 min after glucose administration in patients with liver diseases ($p<0.05$). Disturbances in carbohydrate metabolism were reflected in plasma hyperglycemia and hyperinsulinemia, not only during fasting, but also after an i.v. glucose tolerance test (GTT). Evaluation of the i.v. GTT using the utilization coefficient was a more

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reliable index of disturbed glucose tolerance in cirrhosis patients than the p.o. GTT was. The blood sugar level 60 and 120 min after the i.v. GTT was a more reliable index than the blood sugar level during fasting. Disturbances in hepatic circulation and microcirculation and decreased peripheral utilization of glucose were among the causes of the disturbance in carbohydrate metabolism observed in patients with liver diseases. The metabolic disturbance probably plays an important role in the development of secondary clinical disturbances, the decrease in resistance to stress, and the development of secondary infections.

5177 CHRONIC HEPATITIS FOLLOWING THE USE OF DRUGS. (Dut.) Vogten, A. J. M. (Afdeling Gastroenterologie, Academisch Ziekenhuis te Utrecht, Utrecht, Netherlands). *Ned. Tijdschr. Geneeskd.* 120(17):755-760; 1976.

A great variety of drugs has been reported to cause chronic hepatitis. Criteria for diagnosing this condition include chronic drug use, a hepatitis-like reaction caused by the use of the drug, and the absence of acute liver necrosis and hypersensitivity reactions. Biochemical studies have suggested that one or more of the following mechanisms might account for the pathogenesis of this condition: conversion of the drug into a toxic metabolite, a direct toxic action of the drug on protein and fat metabolism in the liver cell, immunologic effects of the drug, and drug-induced suppression of bile secretion. The symptomatology is similar to that of other forms of chronic hepatitis, but may be more varied. The histological picture is that of an aggressive periportal hepatitis. Some investigators maintain that the histological abnormalities are more focally localized in the liver in the case of chronic drug-induced hepatitis than in other forms. Treatment comprises cessation of drug administration; steroids should be reserved for the most severe reactions. The prognosis depends on the rapidity with which the disease develops, and ranges from complete regression of symptoms to death. Hepatotoxic drugs should be avoided, if possible, or if required, should be carefully monitored.

5178 AGGRESSIVE EMPERIPOLESIS IN CHRONIC HEPATITIS. (Ger.) Bechtelsheimer, H.; Gedigk, P.; Muller, R.; Klein, H. (Pathologisches Institut der Universitat, Postfach, D-5300 Bonn 1, W. Germany). *Klin. Wochenschr.* 54(3):137-140; 1976.

Aggressive emperipolesis was examined quantitatively by conventional microscopy in biopsy specimens from 74 patients with chronic hepatitis. The enumeration was based on the reaction between effector and target cells, which was indicated by the presence of an areola around the embedded lymphocyte, or in later stages of the reaction, by necrosis of the affected hepatocyte. Emperipolesis was evident in all of the specimens obtained from 36 patients with chronic aggressive hepatitis; 10 or more emperipolesis were found in the surroundings of the portal fields. Fewer than 10 emperipolesis were counted in specimens from each of the 48 chronic persistent hepatitis cases; no emperipolesis were seen in nine of the cases. Specimens containing 9-12 emperipolesis were obtained from borderline hepatitis cases, which were difficult to designate as chronic or aggressive based on clinical criteria. Aggressive emperipolesis provides an additional criterion for distinguishing the two principal types of chronic hepatitis.

5179 CRYOPROTEIN COMPLEXES AND PERIPHERAL NEUROPATHY IN A PATIENT WITH CHRONIC ACTIVE HEPATITIS. (Eng.) Farivar, M.; Wands, J. R.; Benson, G. D.; Dienstag, J. L.; Isselbacher, K. J. (Harvard Medical Sch., Boston, MA). *Gastroenterology* 71(3):490-493; 1976.

A cryoprotein complex isolated from the serum of a 59-yr-old woman with chronic active hepatitis and severe peripheral neuropathy was characterized. Electromyography demonstrated a severe peripheral neuropathy, which was most pronounced in the right lower extremity. A liver biopsy showed changes typical of chronic active hepatitis and early postnecrotic cirrhosis. Biopsy of the gastrocnemius showed a type II degeneration, with normal muscle interspersed with atrophic cells and no evidence of vasculitis. These changes did not suggest a myopathy and were considered secondary to the neuropathy. The cryoprotein was composed of immunoglobulin M (IgM), IgG, and hepatitis B surface antigen (HBsAg) and had a concentration of approximately 36 mg/100 ml of serum. Electron microscopic examination of the cryoprotein demonstrated aggregates of Dane particles in close association with the antigenically related tubular and spherical forms of HBsAg. HBsAg, IgM, and IgG were detected by immunofluorescent staining in the intima of small arteries and veins. The association of a high serum level of cryoprotein and deposition of the cryoprotein components in small blood vessels suggests a role for the cryoprotein in the pathogenesis of peripheral neuropathy in chronic active hepatitis.

5180 CHRONIC HEPATITIS: PRESENT CONCEPTION. (Fre.) Traissac, F.-J.; Lamouliatte, H.; Weber, F.; Borg, R. (No affiliation given). *Bordeaux Med.* 8(9):1031-1038, 1040-1041, 1043-1048; 1975.

5181 NOVELTY IN THE PROBLEM OF CHRONIC HEPATITIS. (Rus.) Loginov, A. S. (Central Inst. Gastroenterology, Moscow, USSR). *Ter. Arkh.* 47(9):4-11; 1975.

5182 THE CLINICO-MORPHOLOGICAL FORMS OF CHRONIC HEPATITIS. (Rus.) Loginov, A. S.; Speransky, M. D.; Magnitsky, G. S.; Aruin, L. I.; Tkachev, V. D. (Central Scientific Res. Inst. Gastroenterology, USSR). *Sov. Med.* (5):78-84; 1975.

5183 CLINICAL-MORPHOLOGICAL FORMS OF CHRONIC HEPATITIS. (Rus.) Mansurov, Kh. Kh.

(Scientific Res. Inst. Gastroenterology, Tadzhik SSR Acad. Sciences, USSR). *Sov. Med.* (5):84-86; 1975.

5184 THE DIAGNOSTIC SIGNIFICANCE OF IMMUNOGLOBULIN DETERMINATION IN CHRONIC LIVER DISEASES. III. OBSERVATIONS OF PROGRESS. (Ger.) Ortmans, H.; Wildhirt, W. E.; Welcke, U. (Medizinische Klinik I, Stadtkrankenhaus, D-3500 Kassel, W. Germany). *Munch. Med. Wochenschr.* 118(4):95-98; 1976.

5185 ASSESSMENT OF HEPATIC FUNCTION, NONSPECIFIC IMMUNE REACTIONS AND THE FREQUENCY OF HB (AUSTRALIA) ANTIGENEMIA IN PATIENTS WITH CHRONIC PERSISTING HEPATITIS. (Pol.) Juszczyk, J.; Kiczka, W.; Adamek, N.; Kryska, A. (Instytut Chorob Wewnetrznych AM, 61-003 Poznan, ul. Wincentego 1, Poland). *Pol. Tyg. Lek.* 30(31/32):1299-1302; 1975.

5186 USE OF COBALT CHLORIDE IN SOME CHRONIC DISEASES OF THE LIVER. (Rus.) Neiko, E. M.; Serediuk, N. N.; Mikhalchuk, B. P.; Gerasimchuk, A. S. (Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Vrach. Delo* (2):60-63; 1976.

5187 CALCIUM-2,2'-DISULFOHEXANOATE IN THE TREATMENT OF CHRONIC HEPATITIS. (Ita.) Del Ninno, E.; Tornaghi, G.; Ideo, G. (Istituto di Patologia Speciale Medica e Metodologia Clinica, Universita di Milano, Milan, Italy). *Clin. Ter.* 75(3):257-271; 1975.

5188 QUANTITATIVE DATA IN IgG, IgA and IgM GLOBULINS IN THE SERA OF PATIENTS WITH CHRONIC LIVER DISEASE. (Cze.) Kallai, L.; Keler-Bacoka, M.; Hadzic, N.; Knezevic, S. (Medical Faculty, Zagreb, Yugoslavia). *Acta Med. Iugosl.* 29(3):191-198; 1975.

5189 HEPATOPATHIC HYPOCOMPLEMENTEMIA. (Ita.) Di Perri, T.; Auteri, A.; Tosi, P. (Istituto di Clinica Medica Generale e di Terapia Medica, Universita di Siena, Siena, Italy). *Arch. Ital. Mal. Appar. Dig.* 37(3):141-172; 1975.

See also, 5074, 5146, 5334.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

5190 INCREASE IN TYPE I AND TYPE III COLLAGENS IN HUMAN ALCOHOLIC LIVER CIRRHOSIS. (Eng.) Rojkind, M.; Martinez-Palomo, A. (Albert Einstein Coll. Medicine, 1300 Morris Park Ave., Bronx, New York, NY 10461). *Proc. Natl. Acad. Sci. USA* 73(2):539-543; 1976.

Previous studies have indicated that the cirrhotic liver contains increased amounts of type III collagen, but not type I collagen; experiments were conducted to determine if type I collagen is also increased in the livers of cirrhotic patients. About 30% of the total collagen was isolated postmortum from the livers of one person without liver disease and from the livers of three persons with alcoholic cirrhosis. Analyzed chemically and examined by electron microscopy, the collagen in each case was shown to consist of two types identical with, or resembling closely, type I and type III collagens of skin. The collagen from normal liver was predominantly type I, whereas that from cirrhotic livers consisted of approximately equal amounts of the two types. By carboxymethyl-cellulose chromatography, the type I collagen from the cirrhotic livers showed one α2 chain and two α1 chains. The α1 chains were separable from one another, but gel electrophoretic patterns of peptides obtained from them after digestion with a 10-fold excess of cyanogen bromide (CNBr; 3 mg protein) were almost identical, and resembled the pattern obtained with CNBr peptides of the α1 chain of rat skin type I collagen. The increased collagen of both types was responsible, in part, for the observed distortion of the architecture of the cirrhotic livers associated with increased rigidity of the stroma. The predominance of type III collagen in the areas of collapse of architecture suggests that hepatocytes might have an important function in fibrogenesis during the course of liver cirrhosis.

5191 INHIBITION OF ETHANOL OXIDATION ON PROLONGED FASTING IN MAN: REVERSIBILITY OF FRUCTOSE INFUSION. (Ger.) Bode, J. C.; Thiele, D. (Medizinische Universitatsklinik Marburg, Marburg, Germany). *Dtsch. Med. Wochenschr.* 100(37):1849-1851; 1975.

To determine the degree of inhibition of ethanol oxidation by prolonged fasting, ethanol (0.5 g/kg, i.v., in 400 ml of 0.9% NaCl) was administered to healthy 12- or 36-hr fasted subjects. The alcohol concentration was measured before and during i.v. administration of glucose (0.7 g/kg/hr in a 10% w/v solution) to find out whether the inhibition of alcohol oxidation is reversible through increased NADH reoxidation. An average 43% ($p<0.01$) decrease of alcohol oxidation was seen after 36 hr, compared to 12 hr fasting. This decrease was not observed if fructose was given i.v. The authors conclude that the inhibition of alcohol oxidation in prolonged fasting is caused by decreased reoxidation of NADH in the liver.

5192 THE PRESENT STATUS OF THE BIOLOGICAL RESEARCH ON ALCOHOL. (Nor.) Morland, J. (Institutt for medisinsk biologi, Universitetet i Tromso, Tromso, Norway). *Tidsskr. Nor. Laegeforen.* 96(8):500-503; 1976.

5193 CLINICAL PROBLEMS OF ALCOHOLIC CIRRHOSIS. II. EVALUATION ATTEMPT OF INDIVIDUAL LABORATORY FINDINGS IN PATIENTS WITH LIVER CIRRHOSIS IN VARIOUS STAGES OF THE DISEASE. (Cze.) Knezevic, S.; Kallai, L.; Falisevac, V.; Hadzic, N.; Pichler, E.; Spicer, F. (Univ. Hosp., Zagreb, Yugoslavia). *Acta Med. Iugosl.* 29(2):135-155, 1975.

5194 PRESENT CONCEPTION OF THE PHYSIOPATHOLOGY OF ASCITES AND ITS TREATMENT IN ALCOHOLIC CIRRHOSIS. (Fre.) Traissac, F.-J.; Paccalin, J.; Ragnaud, N.-M.; Weber, F.; Blanc, A. (No affiliation given). *Bordeaux Med.* 8(9):1085-1106; 1975.

5195 ACUTE ALCOHOLIC HEPATITIS AS A NOSOLOGICAL FORM. (Rus.) Mukhin, A. S.; Lebedev, S. P. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Ter. Arkh.* 47(9):22-26; 1975.

5196 ROLE OF ALCOHOLIC HEPATITIS IN THE PATHOGENESIS OF ALCOHOLIC CIRRHOSIS. (Ger.) Winckler, K. (No affiliation given). *Z. Gastroenterol.* 14:232; 1976.

5197 HEPATIC STEATOSIS. (Fre.) Traissac, F.-J.; Paccalin, J.; Blanc, A.; Weber, F.; Ragnaud, J.-M. (No affiliation given). *Bordeaux Med.* 8(9):1049-1066; 1975.

5198 CURRENT BIOCHEMICAL, CLINICAL AND THERAPEUTIC PROBLEMS OF HEPATIC STEATOSIS. (Ita.) De Candia, O.; Mancinella, A.; Bartolucci, E. (Ospedale Civile "Carretta," Montebelluna, Italy). *Clin. Ter.* 73(1):73-84; 1975.

5199 ZIEVE'S SYNDROME (LITERATURE REVIEW). (Rus.) Radbil, O. S. (All-Union Scientific Res. Inst. of Medical and Medico-Technical Information, Moscow, USSR). *Vrach. Delo* (2):57-60; 1976.

See also, 4597, 5123, 5188, 5225, 5289.

LIVER AND BILIARY TRACT

Cirrhosis

5200 THE BILIARY SYSTEM IN PRIMARY BILIARY CIRRHOSIS: A STUDY BY ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY. (Eng.) Summerfield, J. A.; Elias, E.; Hungerford, G. D.; Nikapota, V. L. B.; Dick, R.; Sherlock, S. (Royal Free Hosp., Pond St., London, NW3 2QG, England). *Gastroenterology* 70(2):240-243; 1976.

Endoscopic retrograde cholangiograms from 23 patients with primary biliary cirrhosis (PBC), 10 controls with either normal livers or hepatocellular disease, and 4 patients with sclerosing cholangitis were compared, and the changes were correlated with the duration of the disease, the hepatic histology, and the presence of gallstones. Of the PBC group, 39% had gallstones. The calibers of the common bile duct and left and right intrahepatic ducts were comparable in the PBC and control groups. The small intrahepatic ducts were normal in the control group, but were abnormal in 7 of the 23 PBC patients. These small ducts were irregular in caliber and had a tortuous course. The changes were not related to the presence of gallstones or the duration of the disease, but all the patients had histologically proven cirrhosis. Two patients with cirrhosis had normal intrahepatic ducts. Although the major bile ducts are normal in PBC, there was a high incidence of gallstones (39%), and the changes that did occur in the intrahepatic ducts were probably related to the distorted hepatic architecture due to cirrhosis. The changes may be used as a sign that cirrhosis has supervened.

5201 EXTRACTION OF ^{125}I-ALBUMIN MICROAGGREGATES FROM PORTAL BLOOD. AN INDEX OF FUNCTIONAL PORTAL BLOOD SUPPLY IN CIRRHOTICS. (Eng.) Huet, P.-M.; Marleau, D.; Lavoie, P.; Viallet, A. (Hospital Saint-Luc, 1058 St-Denis, Montreal, Quebec, Canada). *Gastroenterology* 70(1):74-81; 1976.

To investigate the process of uptake by Kupffer's cells, the multiple indicator dilution technique was used in normal dogs, in patients with alcoholic cirrhosis, and in patients with idiopathic noncirrhotic portal hypertension (IPH). Portal and hepatic indicator dilution curves (IDC) were obtained after injection of a mixture of ^{51}Cr-labeled RBC and ^{125}I-albumin microaggregates (^{125}I-AMA) into the cranial mesenteric artery in 15 dogs. The extraction (E) of ^{125}I-AMA from portal blood was measured during one passage through the hepatic reticuloendothelial system. Using [^{51}Cr]RBC as a vascular reference substance, E-^{125}I-AMA was calculated by comparing simultaneous [^{51}Cr]RBC and ^{125}I-AMA portal and hepatic IDC and was expressed as the percentage of ^{125}I-AMA flowing through the portal vein. In 44 experiments (15 dogs), the colloid was almost completely extracted (E-^{125}I-AMA=92.3 ± 1.0%). This approach was applied in 15 patients with severe portal hypertension undergoing combined umbilicoportal, hepatic vein, and superior mesenteric artery catheterization. Eleven patients had alcoholic cirrhosis (AC) and four patients had IPH. Using [^{51}Cr]RBC-IDC, the portal fraction of hepatic blood flow varied between 34.1 and 100% (mean 62.6%) in AC patients and between 56.5 and 91.2% (mean 74.2%) in IPH patients. E-^{125}I-AMA varied from 5.2 to 100% (mean 45.1%) in AC patients, although normal values were obtained in IPH patients (mean 93.2%). The extraction of indocyanine green (E-ICG) was calculated for all patients using a continuous infusion for the estimation of hepatic blood flow. E-ICG was decreased in AC patients (mean 22.1%), although normal values were obtained in IPH patients (mean 49.5%). A significant correlation was found between E-^{125}I-AMA and E-ICG ($r=0.977$, $p<0.001$). A significant correlation between E-^{125}I-AMA and the relative clearance of ICG ($r=0.906$, $p<0.001$) was found in all patients. The correlations between the extraction or clearance of substances removed by two different cell populations suggest that their decreases are mainly due to changes in liver microcirculation. In cirrhotics, the decreased E-^{125}I-AMA can be related to part of the portal blood by-passing Kupffer's cells (intrahepatic portohepatic shunts) and/or to sinusoidal changes responsible for ineffective phagocytosis. Thus, E-^{125}I-AMA can be used as an estimation of the functional portal blood supply to the liver in cirrhotics. Using portal and hepatic IDC after injection of [^{51}Cr]RBC and ^{125}I-AMA into the superior mesenteric artery, the portal fraction of hepatic blood flow and the functional portal blood supply can be estimated simultaneously in patients with portal hypertension before portacaval shunts.

5202 INDIAN CHILDHOOD CIRRHOSIS OF THE LIVER: A MORPHOLOGIC EVALUATION. (Eng.)

Mehrotra, M. L.; Gupta, S.; Gupta, I. M.; Bhargava, V.; Katiyar, G. P. (Inst. Medical Sci., Banaras Hindu Univ., Varanasi, India). *Trop. Geogr. Med.* 27(4): 333-338; 1975.

The morphological changes in various stages of Indian childhood cirrhosis of the liver (ICC) were studied histologically in biopsy specimens from 44 children. Ballooning and feathery degeneration of hepatocytes, complete absence of fatty change, frequent occurrence of intracytoplasmic hyaline bodies, dissection of pseudolobules by fibrous septa, and fibrosis around single cells were notable features. A few cases also showed giant-cell transformation and pseudoadenomatous arrangement of hepatocytes. These observations suggest that the basic morphologic alterations in ICC are diffuse liver cell damage and replacement fibrosis, the latter of which may be due to some toxic factor.

5203 EFFECT OF AN ANABOLIC STEROID (METHENOLONE ENANTHATE) ON THE INTRA- AND EXTRAVASAL ALBUMIN POOL IN LIVER CIRRHOSIS. (Ger.)

Knobel, H.; Becker, L. (Augenklinik und Poliklinik, 2 Hamburg 20, Martinistrasse 52, W. Germany). *Z. Gastroenterol.* 13(6):583-587; 1975.

To determine whether the anabolic steroid, methenolone enanthate, increases serum albumin levels, 15 patients (aged 20-67 yr) with compensated liver cirrhosis and statistically proven decreased daily albumin turnover (0.129 ± 0.039 g/kg/) were treated with methenolone enanthate (200 mg/week) for 4 weeks. In addition, the possibility that the increased serum albumin levels were due to a shift from the extra- to the intravascular pool or were the result of a real increase in the total body albumin pool was investigated. Five normal controls had albumin metabolism rates of 0.172 ± 0.035 g/kg. None of the patients had ascites, edema, or icterus. The daily turnover rate and the intra- and extravascular pool before and after treatment were determined through indirect measurement with iodine-125 albumin. The results of this study do not support the hypothesis that although anabolic steroids improve albumin synthesis, they establish an equilibrium between extra- and intravascular space. Methenolone enanthate increased the daily albumin turnover in the patients with cirrhosis of the liver from 0.129 ± 0.039 g/kg to 0.140 ± 0.043 g/kg; the increase was proportional to the amount of reduction before treatment.

5204 ENDOTOXEMIA IN LIVER CIRRHOSIS. (Ger.)

Liehr, H.; Gruen, M.; Brunswig, D.; Sautter, T. (Med. Univ. Klinik, D-8700 Wurzburg, Josef-Schneider-Strasse 2, W. Germany). *Z. Gastroenterol.* 14(1):14-23, X; 1976.

The incidence, progress, and significance of endotoxemia were examined in 29 patients with cirrhosis of the liver, mostly of alcoholic origin, confirmed by laparoscopy and histologic examination. More or less extensive portacaval collaterals were present in most cases. Nine of the patients were hospitalized for hemorrhage from esophageal varices, and 14 for generalized deterioration. The limulus gelation test was negative in control plasmas, but gave positive results in 115 of the 292 plasma samples collected from the cirrhosis patients. Endotoxemia was already present at the time of hospitalization in 19 patients and developed during observation in another 4 patients; it was demonstrated in 79%. Positive results in the limulus test were linked with clinical manifestations, such as bleeding varices (positive in 78%), functional renal impairment (75%), consumption coagulopathy (81%), and pyrogenic reaction (82%). Comparison of the patterns of symptoms in patients with and without endotoxemia yielded no detectable differences. The dilution method of the limulus test was found to be more sensitive for free endotoxemia than the chloroform method. A quantitative test method for endotoxin would permit improved differentiation.

5205 HEPATITIS B ANTIGEN IN LIVER CIRRHOSIS AND HEPATOCELLULAR CARCINOMA. (Eng.)

Bartok, I.; Decastello, A. (Peterfy Hosp., P.O. Box 76, H-1441 Budapest, Hungary). *Acta Hepatogastroenterol.* 22(6):379-386; 1975.

The frequency of hepatitis B antigen (HBAg) among 43 patients with cirrhosis, 18 of whom had primary hepatocellular carcinoma, was determined at autopsy, and morphological changes related specifically to the presence of HBAg in the cirrhotic liver were sought. HBAg and its antibody, anti-HB, were determined by counter-electrophoresis in blood samples taken at autopsy from these patients and from 120 patients who died of other diseases (age-matched controls). HBAg was detected in the sera of six patients with cirrhosis and one control. Of 25 cases of macronodular cirrhosis, HBAg was associated with the active form in 3 cases and with the inactive form in 2 cases. One HBAg-positive patient with active macronodular cirrhosis also had hepatocellular carcinoma. Another HBAg-positive patient was among 13 patients with alcoholic micronodular cirrhosis. HBAg was not found in the one patient with secondary biliary micronodular cirrhosis or in four patients with unclassified cirrhosis. Anti-HB was not found in any of the patients or controls. The results suggest that the persistence of the hepatitis B virus is not of major importance in tumor genesis. It seems that liver cirrhosis rather than this virus, plays a primary role in the development of hepatocellular carcinoma.

5206 LYMPHOCYTE CYTOTOXICITY AND INHIBITION STUDIED WITH AUTOLOGOUS LIVER CELLS: OBSERVATIONS IN CHRONIC ACTIVE LIVER DISEASE AND THE PRIMARY BILIARY CIRRHOSIS SYNDROME. (Eng.)

Geubel, A. P.; Keller, R. H.; Summerskill, W. H. J.; Dickson, E. R.; Tomasi, T. B.; Shorter, R. G. (Cliniques Universitaires St. Pierre, Univ. Louvain, Louvain, Belgium). *Gastroenterology* 71(3):450-456; 1976.

A method for determining the cytotoxicity of normal and autologous lymphocytes for ^{51}Cr-labeled isolated parenchymal liver cells in a low aggressor-to-target cell ratio is described. The results from 25 patients with chronic active liver disease (CALD), 5 patients with chronic persistent hepatitis, 15 patients with miscellaneous liver disease, and 20 patients with primary biliary cirrhosis (PBC) were compared, and the hypothesis that *in vivo* lymphocyte-mediated liver cell damage occurs in CALD and PBC was tested. ^{51}Cr-labeled parenchymal cells (minimum, 5×10^4; mean, 10×10^4 cells) were mixed with either autologous (test) or normal (control) lymphocytes in a lymphocyte-to-target cell ratio of 10:1; after 4 hr of incubation at 37 C, the radioactivity in the supernatant of the suspension after centrifugation at 160 x *g* was determined. In 53% of CALD patients, the lymphocytes showed greater cytotoxicity for hepatic cells than did normal allogenic lymphocytes, but in 32% there was significantly less ^{51}Cr release than normal; in the remainder of CALD patients, the results were in the normal range. Lymphocyte cytotoxicity was greater in patients with disease of short duration and less in those treated with corticosteroids. In untreated CALD patients, decreased ^{51}Cr release was associated with the presence of plasma factor(s) inhibiting phytohemagglutinin (PHA)-induced transformation of normal lymphocytes. Lymphocytes from approximately 50% of the patients with PBC exhibited cytotoxicity for hepatic cells; however, 25% showed less ^{51}Cr release than did controls, and the remaining patients had results in the normal range. Lymphocyte cytotoxicity was also greater during the earlier stages of PBC. In contrast to CALD, decreased ^{51}Cr release was not associated with the presence of plasma factor(s) inhibiting PHA-induced transformation of normal lymphocytes. These findings support the hypothesis of *in vivo* lymphocyte-mediated liver cell damage in CALD and PBC, suggesting a potentially important role for lymphocyte suppression in the pathogenesis of both diseases.

5207 HEMODYNAMIC RESPONSE TO ACUTE TREATMENT WITH LEVODOPA IN CIRRHOTIC PATIENTS. (Ita.)

Butti, A.; Borzone, A.; Nanni, G.; Cagossi, M.; Bianco, A.; Civello, I. M.; Lojacono, L. (Istituto di Clinica Chirurgica Generale e Terapia Chirurgica, Universita Cattolica del Sacro Cuore, Rome, Italy). *Chir. Patol. Sper.* 23(3):123-138; 1975.

Twenty cirrhotic patients in hepatic coma were treated with 1 g L-dopa, p.o., to determine its effects on hemodynamics. There was an initial decrease in cardiac parameters ($p<0.05$ for heart rate and cardiac index, and $p<0.001$ for stroke work and mean blood pressure) and in peripheral parameters (negligible for total peripheral resistance and consumption of O_2/m^2, $p<0.001$ for arterovenous difference in O_2). However, after about 90 min, the peripheral parameters increased while the cardiac parameters continued to decrease. A biphasal action of L-dopa is hypothesized, with an initial alteration of the cardiac to peripheral parameters ratio, followed by an improvement in the tissue perfusion indices. This is interpreted as the effect of an initial mass action of L-dopa, which is caused by false neurotransmitters, and which consumes itself early. The hypothesis is supported by a late rise in the arterovenous difference in O_2 and in the venous CO_2 pressure, and by a decrease in relative peripheral shunting and ventricular function towards the end of the experiment (150-180 min).

5208 PORTAL HYPERTENSION AND PRIMARY BILIARY CIRRHOSIS. (Eng.)

Lebrec, D.; Sicot, C.; Degott, C.; Benhamou, J.-P. (Unite de Recherches de Physiopathologie hepatique [Inserm], Hopital Beaujon, F-92110 Clichy, France). *Digestion* 14(3):220-226; 1976.

Twenty-four patients with primary biliary cirrhosis (PBC) were investigated to determine the frequency of portal hypertension and whether the presinusoidal or postsinusoidal type hepatic block is responsible for portal hypertension. In addition, the relation of portal hypertension to the development of true cirrhosis, the clinical manifestations of portal hypertension, and the value of surgical portacaval shunt in the treatment of portal hypertension in PBC was studied. Esophageal varices were present in 20, 50, and 90% of the patients 1, 3, and 9 yr, resp., after the onset of pruritus and/or jaundice. Portal hypertension was responsible for gastrointestinal bleeding in 11 patients; bleeding was the first clinical manifestation of PBC in two of them. Wedged hepatic venous pressure was increased in all of the 14 patients with portal hypertension tested (≥ 5 mm Hg), whether regenerative nodules were present or absent; the mean value for the gradient between wedges and free hepatic venous pressures in 7 patients with regenerative nodules was 17 mm Hg and for those without nodules, 7 mm Hg ($p<0.01$). Portacaval shunt was performed in five patients and was well tolerated in three of them. One patient died from liver failure 3 months after surgery and was found to have regenerative nodules in the liver specimen. Pruritis combined with jaundice, and episodes of hepatic encephalopathy were complications arising in other patients following surgery. It is concluded that portal hypertension is common in PBC; that the intrahepatic block is of the so-called postsinusoidal type, even in patients without regenerative nodules; that gastrointestinal bleeding due to portal hypertension occurs in about half of the patients and may be the first manifestation of PBC; and that portacaval shunt seems to be indicated when gastrointestinal bleeding occurs in the earlier stage of the disease.

5209 URINARY AND SERUM OCTOPAMINE IN PATIENTS WITH PORTAL-SYSTEMIC ENCEPHALOPATHY. (Eng.) Manghani, K. K.; Lunzer, M. R.; Billing, B. H.; Sherlock, S. (D/8 Ferreira Mansion, Sitla Devi Temple Road, Mahim, Bombay 16, India). *Lancet* 2(7942):943-946; 1975.

To determine the usefulness of the measurement of octopamine as a marker of hepatic encephalopathy, its urinary excretion and serum concentration were studied in 17 controls, 33 patients with portal-systemic encephalopathy, and 13 patients with liver disease without encephalopathy. The assay of urinary octopamine depended upon the conversion of β-hydroxylated amines to their ^{14}C-N-methyl derivatives by the action of phenylethanolamine-N-methyltransferase in the presence of ^{14}C-S-adenosyl methionine. No significant differences were detected between control subjects and patients without encephalopathy. The urinary excretion of octopamine was significantly higher in patients with encephalopathy (mean, 148.4 μg/24 hr), compared with those without encephalopathy (66.2 μg/24 hr). Serum octopamine was also elevated in the patients with encephalopathy (16.4 ng/ml) in comparison to controls (4.6 ng/ml) and patients without encephalopathy (5.1 ng/ml). When the means for urinary octopamine excretion were compared among patients with encephalopathy, a significant increase was evident between patients in precoma (grades 1-3) and in coma (grade 4), between grade 0 and grade 1, and between grade 3 and grade 4. In five patients with encephalopathy, an improvement in the grade of encephalopathy was accompanied by a fall in the urinary excretion or serum concentration of octopamine. The measurement of octopamine in patients with liver disease may be used as a marker of hepatic encephalopathy. Octopamine may be involved in the pathogenesis of portal-systemic encephalopathy.

5210 CONTEMPORARY CONCEPT OF HEPATIC MICROCIRCULATION: A BETTER UNDERSTANDING OF THE PORTAL FLOW INVERSION IN ADVANCED CIRRHOSIS. (Fre.) Osteaux, M.; Jeanmart, L.; Drochmans, P.; Bollaert, A. (Service de Radiodiagnostic, Institut Jules-Bordet Brussels, Belgium). *J. Radiol. Electrol. Med. Nucl.* 57(2):191; 1976.

5211 STUDY OF THE CORRELATION OF THE SCINTIGRAPHIC PARAMETERS AND OF THE BIOHUMORAL INDICES IN LIVER CIRRHOSIS. (Ita.) Piaggi, V.; Roncaia, R.; Boraldi, F. (Istituto di Clinica Medica Generale e Terapia Medica, Universita di Modena, Modena, Italy). *Prog. Med. (Roma)* 31(4):170-177; 1975.

5212 GASTRODUODENAL ULCER IN CIRRHOTIC PATIENTS DURING HEMORRHAGIC PERIOD. RADIOLOGICAL STUDY. (Fre.) Nahum, H.; Cazard, G.; Desbleds, M. T.; Marsault, C. (No affiliation given). *J. Radiol. Electrol. Med. Nucl.* 57(2):190-191; 1976.

5213 DRUG THERAPY FOR LIVER CIRRHOSIS. (Nor.) Ritland, S. (Medisinsk avdeling A, Rikshospitalet, Norway). *Tidsskr. Nor. Laegeforen.* 96 (8):509-512; 1976.

5214 TREATMENT OF HEPATOPATHIES WITH MONOARGININE ALPHA-KETOGLUTARATE. (Por.) Lacerda Machado, A. (Fac. Medicina, Universidade Federal do Ceara, Ceara, Brazil). *Folha Med.* 70(5):417-420; 1975.

5215 CHANGE IN GLUCOSE TOLERANCE IN THE COURSE OF LIVER CIRRHOSIS: CHANGES PROVOKED BY TREATMENT WITH URIDINE DIPHOSPHOGLUCOSE AND REDUCED GLUTATHIONE. (Ita.) Mori, R.; Bianco, A.; Cagossi, M. (Istituto di Clinica Medica, Universita Cattolica de Sacro Cuore, Rome, Italy). *Fegato* 20(3):203-214; 1974.

5216 DIETETICS IN PORTACAVAL ENCEPHALOPATHIES. (Fre.) Traissac, F.-J.; Blanc, A.; Cabanel, M.; Lantuit, P.; Paccalin, J. (No affiliation given). *Bordeaux Med.* 8(10):1149-1164; 1975.

5217 EFFECTS OF EXPERIMENTAL SIDE-TO-SIDE PORTACAVAL ANASTOMOSIS ON THE LIVER. HISTOLOGICAL STUDY. (Fre.) Kayabali, I.; Tuzel, H. (Clinique Chirurgicale, Faculte de Medecine, Ankara, Turkey). *Lyon Chir.* 71(5):312-314; 1975.

5218 HEPATIC VENOGRAPHY BY BALLOON CATHETER FOLLOWING PORTACAVAL END-TO-SIDE SHUNT IN LIVER CIRRHOSIS. (Ger.) Butzow, G. H.; Becker, K.; Novak, D. (No affiliation given). *Z. Gastroenterol.* 14:237-238; 1976.

5219 PORTAL HYPERTENSION: SHUNTS. (Spa.) Pataro, V. F.; Alche, S.; Zeilicoff, R.; Trainini, J. C.; Tronge, C. F.; Heise, R. J.; Svarch, N. M. (Servicio de Clinica Quirirgica, Policlinico "Prof. Ricardo Finochietto," Avellaneda Pcia., Buenos Aires, Argentina). *Prensa Med. Argent.* 62(8):168-171; 1975.

5220 PORTACAVAL BYPASSES IN THE PORTAL HYPERTENSION SYNDROME. (Rus.) Potemkina, E. V.; Iarema, I. V.; Iatsenko, A. A. (Moscow Medical Inst. Stomatology, Moscow, USSR). *Khirurgiia (Mosk.)* (11):85-90; 1975.

5221 CIRRHOSIS AND PORTAL HYPERTENSION. (Nor.) Christophersen, E. B. (Kirurgisk avdeling A, Rikshospitalet, Norway). *Tidsskr. Nor. Laegeforen.* 96(8):493-496; 1976.

5222 PECULIARITIES OF ALBUMIN METABOLISM IN PATIENTS WITH ALCOHOLIC LIVER CIRRHOSIS. (Rus.) Orzikulov, Kh. K. (Inst. Gastroenterology, Tadzhik SSR Acad. Sciences, Dushanbe, USSR). *Ter. Arkh.* 47(9):26-29; 1975.

5223 HEPATIC ARTERIOGRAPHY IN CIRRHOSIS WITH PORTAL HYPERTENSION. (Fre.) Bollaert, A.; Baert, A.; Dagnelie, J. (Hopital Universitaire Saint-Pierre, Brussels, Belgium). *J. Radiol. Electrol. Med. Nucl.* 57(2):189; 1976.

5224 PATHOGENESIS OF LIVER CIRRHOSIS. (Rus.) Aslamazova, E. B.; Stroganova, E. V.; Dzhinanyan, V. L. (Tbilisi Medical Inst., Tbilisi, USSR). *Ter. Arkh.* 47(9):30-34; 1975.

5225 RETROGRADE INVESTIGATIONS OF HISTOLOGICAL FINDINGS IN CHRONIC ACTIVE HEPATITIS (CAH) AND ALCOHOLIC HEPATITIS (AH) WITH SPECIAL REFERENCE TO THE RELATIONSHIPS BETWEEN LIVER CELL NECROSIS AND INTRAHEPATIC VESSELS. (Ger.) Ohta, W.; Inoue, T.; Fukuhara, J.; Kubota, M.; Uhida, M.; Itoshima, T.; Shimada, Y.; Bode, J. Ch.; Martini, G. A. (No affiliation given). *Z. Gastroenterol.* 14:233; 1976.

5226 THE SYMPTOM HEMOBILIA: CASE REPORT IN PRIMARY BILIARY CIRRHOSIS. (Ger.) Munte, A.; Krumpoch, B.; Eisenburg, J. (I. Medizinische Klinik der Universitat, D-8000 Munich 2, Ziemssenstr. 1, W. Germany). *Munch. Med. Wochenschr.* 117(42):1695-1696; 1975.

5227 LIVER TRANSPLANTATION IN CIRRHOSIS. (Nor.) Aune, S.; Stadaas, J. O. (Avdeling II, Ulleval sykehus, Ulleval, Norway). *Tidsskr. Nor. Laegeforen.* 96(8):497-499; 1976.

5228 SOME PROBLEMS OF THE CLINICAL PICTURE AND MORPHOLOGICAL CHANGES OF THE LIVER IN HEPATIC COMAS. (Rus.) Gordeladze, A. S.; Valenkevich, L. N.; Yakhontova, O. I. (Leningrad Inst. Medicine and Hygiene, Leningrad, USSR). *Klin. Med.* 54(2):62-66; 1976.

See also, 4806, 4808, 5073, 5074, 5096, 5118, 5126, 5176, 5184, 5334.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

5229 INFLUENCE OF THE DEFERENT BILE DUCTS ON BILE ACID COMPOSITION. INVESTIGATIONS IN PATIENTS WITH CHOLESTEROL CALCULI AND IN A NORMAL CONTROL GROUP. (Ger.) Bruhl, W. (I. Medizinische Klinik, Med. Hochschule, D-2400 Lubeck, Kronsforder Allee 71/73, W. Germany). *Z. Gastroenterol.* 13 (8):690-694; 1975.

To determine whether the deferent bile ducts influence the composition of the bile acids, changes in the composition of bile acids were compared from liver cell to gallbladder. The bile acids were examined by spectrophotofluorometry after thin-layer chromatography in 24 cadaver livers and gallbladders. Half of the organs were taken from patients with cholesterol calculi, all of which showed chronic inflammatory changes in the gallbladder. The cholic, deoxycholic, and chenodeoxycholic acid concentrations in the hepatic tissue were 1.72 ± 0.59, 1.30 ± 0.48, and 2.81 ± 1.01 μg/100 mg, resp., in the gallstone patients, and 3.88 ± 0.9, 2.09 ± 0.91, and 4.74 ± 1.29 μg/100 mg, resp., in the normal subjects. The ratio between cholic acid and deoxycholic acid plus chenodeoxycholic acid was significantly lower in the liver tissue and gallbladder than in the control group. Bile acid concentrations were decreased only in the liver tissue of the gallstone-bearing cadavers. Although there was a clear-cut correlation between bile acid concentrations in the liver tissue and the gallbladder in the control group, no correlation was found in the organs of the gallstone-bearing cadavers. It is assumed that the inflammation of the gallbladder accompanying cholesterol calculi influences the bile acid composition.

5230 COMPOSITION OF BILIARY LIPIDS AND KINETICS OF BILE ACIDS AFTER CHOLECYSTECTOMY IN MAN.

(Eng.) Kimball, A.; Pertsemlidis, D.; Panveliwalla, D. (Roosevelt Hosp., 428 W. 59 St., New York, NY 10019). *Am. J. Dig. Dis.* 21(9):776-781; 1976.

Because of conflicting reports regarding the composition of biliary lipids and the kinetics of bile acid metabolism after cholecystectomy, postcholecystectomy biliary lipid composition and bile acid kinetics were studied in 24 women and 4 men. Hepatic bile was collected periodically for as long as 4 months without interrupting the enterohepatic circulation and without infecting the biliary system. In 23 patients with cholesterol gallstones, fasting biliary cholesterol made up 10.2% of total lipids in the steady state; in 5 patients with bilirubinate stones, saturation of fasting hepatic bile with cholesterol was lower (8.7% of total lipids). The percentage of deoxycholic acid after cholecystectomy (21% of total bile acids) was not significantly higher than that of seven healthy, noncholecystectomized controls (26%). Postcholecystectomy studies of diurnal variation of biliary lipids in seven patients showed that the postprandial hepatic bile had a cholesterol saturation (mean=7.9%) that was significantly lower than fasting bile (11.2%). Pool sizes of cholic and chenodeoxycholic acids were low (average 0.4 g/70 kg, each). Total synthesis for both bile acids was normal (average 460 mg/day/70 kg), but fractional turnover rates of the two primary bile acids increased after cholecystectomy, probably due to more frequent recycling of the small bile acid pool. This study supports the view that in most patients with cholesterol gallstones, the formation of lithogenic bile by the liver is not corrected by cholecystectomy.

5231 ANTIBIOTICS IN BILIARY DISEASE: THE RELATIVE IMPORTANCE OF ANTIBIOTIC CONCENTRATIONS IN THE BILE AND SERUM.

(Eng.) Keighley, M. R. B.; Drysdale, R. B.; Quoraishi, A. H.; Burdon, D. W.; Alexander-Williams, J. (General Hosp. and Univ. Birmingham, Birmingham, England). *Gut* 17(7): 495-500; 1976.

A randomized controlled trial was performed in 150 patients undergoing biliary operations to determine whether rifamide, an antibiotic that is excreted almost entirely in bile, is preferable to gentamicin, an antibiotic having satisfactory serum levels only. The patients were allocated to one of three groups: 50 received gentamicin (150 mg, i.m.), 50 received rifamide (80 mg, i.m.), and 50 controls received no antibiotic cover. The antibiotics were administered at the specified dose twice on the day of the operation, and every 8 hr for 5 days thereafter. Bile was aspirated from the gallbladder in 78 patients receiving antibiotics and from the bile duct through the cholangiogram catheter in 70 of these cases. The biliary and serum levels of antibiotics that were considered to be adequate for prophylactic therapy were 62 mg/l for rifamicin and 4 mg/l for gentamicin. Adequate serum gentamicin levels were present in 88% of 43 patients, but the levels in bile were extremely low; only two gallbladder samples and none of the collections from the bile duct exceeded 4 mg/l. None of the patients had adequate serum rifamide concentrations. When there was no biliary obstruction, however, rifamide bile levels were high (in many cases exceeding 1,000 mg/l). When the cystic duct was obstructed, the gallbladder levels of rifamicin were less than 5 mg/l, and adequate bile levels were achieved in only two jaundiced patients. Wound sepsis occurred in 22% of controls, in 10% of those receiving rifamide, and in only 6% of those receiving gentamicin ($p<0.05$, in comparison to controls). Gentamicin was also associated with a significant reduction of septicemia, from 14% to 2% compared with controls. These results suggest that adequate serum levels of an effective antimicrobial agent are more important in reducing the septic complications of biliary operations than an antibiotic that is excreted almost entirely into the bile.

5232 PERIAMPULLARY CANCER: A CLINICOPATHOLOGIC STUDY OF SIXTY-TWO PATIENTS. (Eng.)

Wise, L.; Pizzimbono, C.; Dehner, L. P. (Long Island Jewish-Hillside Medical Center, New Hyde Park, NY 11040). *Am. J. Surg.* 131(2):141-148; 1976.

Clinical experience with 62 patients with periampullary cancer, including carcinomas of the terminal common bile duct, terminal pancreatic duct, and the duodenum located near the ampulla of Vater is reviewed. Correct preoperative diagnosis was made in only 25% of the cases. Weight loss, anorexia, and obstructive jaundice were the most common clinical features. Associated diseases included chronic duodenal ulcer in five patients, diabetes mellitus in two, cirrhosis in one, and pernicious anemia in one. Eleven patients had had a cholecystectomy for cholelithiasis. Preoperative laboratory studies showed that almost half of the patients were anemic and more than 70% had guaiac-positive stools. Serum bilirubin levels were gradually increasing in 30 of 56 patients. At laparotomy, the tumor was palpable through the duodenal wall in 95% of the patients. The surgical treatment in this series included 47 curative and 15 palliative procedures. Biopsies for immediate frozen section examination were positive for carcinoma in 36/43 patients, intermediate in 3/43, and negative in 4/43. Operative mortality was about 14%. The authors conclude that: in patients with obstructive jaundice, the periampullary area should be carefully palpated even in the presence of stones in the common bile duct; the diagnosis of periampullary carcinoma versus carcinoma of the head of the pancreas is a macroscopic topographic rather than a histologic diagnosis; although node involvement decreases the 5-yr survival rate, it does not exclude it, therefore, nodal involvement is not a contraindication for radical resection; and in elderly, poor risk patients with small localized tumors, local resection may be an acceptable alternative to pancreatoduodenectomy.

5233 PRIMARY SCLEROSING CHOLANGITIS AND ULCERATIVE COLITIS. (Eng.) Morl, M.; Classen, M. (Stoffwechselklinik der LVA Wurttemberg, D-699 Bad Mergentheim, W. Germany). *Acta Hepatogastroenterol.* 22(6):415-419; 1975.

The case of a 36-yr-old man with a rare combination of ulcerative colitis and primary sclerosing cholangitis is reported. Disease of the biliary tract was suspected on the basis of the endoscopic retrograde examination of the common bile duct; there were massive pathological changes in the entire bile duct system, with considerable variation in the caliber of the common bile, cystic, and hepatic ducts. The filling of the gallbladder was inhomogeneous. The biliary tract disease was serologically differentiated from a chronic destructive, nonsupperative cholangitis because there were no antimitochondrial antibodies. A hepaticojejunostomy was carried out to normalize the bile flow.

5234 SPHINCTEROTOMY TREATMENT FOR BILIARY TRACT STONES. A RETROSPECTIVE REVIEW. (Eng.) Meyhoff, H. H. (St. Joseph's Hosp., Copenhagen, Denmark). *Acta Chir. Scand.* 141(7):645-648; 1975.

The cases of 106 patients with biliary tract stones, who underwent an operative procedure that included transduodenal sphincterotomy, are reviewed. The patients underwent supraduodenal choledochotomy with an attempt to carry out conventional sanitation of the biliary tract before the transduodenal sphincterotomy. The indication for sphincterotomy was mainly the presence of wedged papillary stones or multiple common duct stones. Fifty-two patients underwent i.v. cholangiography at least 2 yr postoperatively as a follow-up to surgery. Fifty-one patients had papillary stones removed via the sphincterotomy. Stones were missed in 8 of 102 patients, but were passed spontaneously in 2 patients during the observation period. Postoperative mortality was 10.4%, and four deaths were due to fatal pancreatitis. It is concluded that the procedure of sphincterotomy allows certain identification and removal of wedged papillary stones, but does not always allow that missed stones will be passed spontaneously.

5235 GALLBLADDER DISEASE IN THE YOUNG MALE. (Eng.) Haff, R. C.; Andrassy, R. J.; LeGrand, D. R.; Ratner, I. A. (U.S.A.F. Medical Center, Lackland Air Force Base, TX 78236). *Am. J. Surg.* 131(2):232-234; 1976.

The process of gallbladder disease in young men was assessed in 18 male patients, aged 6 months-20 yr, undergoing cholecystectomy. The medical history of these patients was obtained from a survey of 2,614 patients undergoing cholecystectomy at two large hospitals during a 5-yr period. The duration of preoperative symptoms ranged from 1 day to 3.5 yr. Five patients had acalculous cholecystitis; in three, this was associated with systemic sepsis, and in two, the acalculous cholecystitis was associated with biliary tract anomalies. Of the 13 patients with cholelithiasis, two had sickle cell disease and one had Gilbert's disease; the remaining patients had none of the predisposing factors to gallbladder disease in young males. None of the 12 patients having cholecystectomy alone had complications. Four of the six patients subjected to manipulation of the common bile duct in association with cholecystectomy had complications, but no fatalities occurred. Although gallbladder disease resulting in cholecystectomy in young males remains rare, the presence of abdominal pain, jaundice, or unexplained fever should lead to investigation of the biliary tract.

5236 BENIGN TUMORS AS THE CAUSE OF EXTRAHEPATIC OBSTRUCTION SYNDROME. REPORT ON A NEUROMA OF THE BILE DUCTS. (Ger.) Wiermann, H.; Wienbeck, M. (Endokrinologische Abteilung, Med. Universitats-Klinik, D-43 Essen, Hufelandstrasse, W. Germany). *Z. Gastroenterol.* 13(8):685-689; 1975.

A case of common bile duct neuroma in a 29-yr-old patient is described. Icterus had been present for two months. Duodenoscopy with choledochopancreatography showed disjuncture of the common bile duct above the junction with the cystic duct. An extrahepatic bile duct tumor was diagnosed by retrograde endoscopic cholangiography. Laparoscopy confirmed the diagnosis, and surgery was performed. Histological examination revealed neuroma with a marked increase in nerve fibers and formation of collateral fibrosis. Three months postoperatively, clinical examination and laboratory tests showed no evidence of pathological changes.

5237 DIAGNOSIS OF LESIONS OF THE TERMINAL COMMON BILE DUCT AND PAPILLA OF VATER. (Rus.) Dzhavadian, A. M.; Kushnir, V. K.; Baronin, A. A. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (11):94-98; 1975.

5238 INTEGRATED PROCEDURE FOR THE DIAGNOSIS OF HEPATOBILIARY DISEASES (MINIMAL PROCEDURE). (Spa.) Groszmann, R. J.; Chojkier, M.; del Soldato, G. (Policlinico A. Posadas, Martinez de Hoz y Perdriel, Haedo, Argentina). *Acta Gastroenterol. Latinoam.* 6(4):137-148; 1974.

5239 PREOPERATIVE CHOLANGIOGRAPHY (PERSONAL CASES AND CRITICAL EVALUATION). (Ita.) Bianca, T.; Polto, F.; Fusto, A.; Donati, A.; Di Stefano, F. (Istituto di Anatomia Chirurgica e Corso di Operazioni, Universita di Catania, Catania, Italy). *Chir. Ital.* 26(6):920-938; 1974.

5240 SECOND AND MULTIPLE OPERATIONS ON THE BILIARY TRACT: FOLLOW-UP OF 90 PATIENTS. (Ger.) v. Schoning, G.; Haring, R. (Klinikum Steglitz der Freien Universitat, D-1000 Berlin 45, Hindenburgdamm 30, W. Germany). *Munch. Med. Wochenschr.* 117(45):1805-1808; 1975.

5241 EXTERNAL DRAINAGE AND BILE DUCT SUTURES AFTER CHOLEDOCHOTOMY. (Rus.) Sitenko, V. M.; Nechai, A. I.; Stulakov, V. V.; Novikov, K. V. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Vestn. Khir.* 115(10):25-32; 1975.

5242 OUR EXPERIENCE WITH PAPILLOSPHINCTEROPLASTY. (Ita.) Silvestri, F.; Bondi, S.; Jaus, R. (Ospedale Generale Provinciale, Chioggia, Italy). *Chir. Ital.* 26(6):803-813; 1974.

5243 CAUSES ACCOUNTING FOR THE DEVELOPMENT OF PANCREATITIS AFTER CHOLECYSTECTOMY. (Rus.) Saveliev, V. S.; Buyanov, V. M.; Vorobiev, L. P. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (2):97-101; 1976.

5244 OBSERVATIONS ON THE CLINICAL VALUE OF THE RESECTION OF THE SPHINCTER OF ODDI. (Pol.) Wladzinski, J. (Instytut Chirurgii WAM, Lodz, Poland). *Pol. Przegl. Chir.* 48(3):399-402; 1976.

5245 CURRENT VIEWS ON DRUG THERAPY FOR HEPATIC AND BILIARY DISEASES: PART I. (Ita.) Donatelli, L.; Marmo, E. (Istituto di Farmacologia della I Facolta di Medicina, Universita di Napoli, Naples, Italy). *Clin. Ter.* 76(5):395-409; 1976.

5246 ADENOMYOMATOSIS AND "CHOLECYSTOSIS" OF THE GALLBLADDER. (Ita.) Paoli, M.; Nannelli, U.; Bruno, S.; Bartolini, P. (Divisione Chirurgia Generale, Ente Ospedaliero Generale "O. Basilewsky," Florence, Italy). *Osp. Ital. Chir.* 27(6):335-350; 1974.

5247 SIGNIFICANCE OF THE RESIDUAL HEPATOCHOLEDOCHAL DILATATION FOLLOWING THE MAJOR METHODS OF SURGICAL TREATMENT OF BENIGN STENOSIS OF THE TERMINAL CHOLEDOCHUS DUCT. (Rum.) Fopa, Gh.; Medianu, D. (Clinica chirurgicala, Spitalul clinic Fundeni, Bucharest, Rumania). *Chirurgia (Bucur.)* 25(1):51-56; 1976.

5248 CONGENITAL CYSTIC DILATATION OF THE BILE DUCT. (Ita.) Sassi, P.; Tassoni, U.; Zanetti, A.; Cappello, I. (Istituto di Radiologie e del Radio, Universita di Bologna, Bologna, Italy). *Arch. Ital. Mal. Appar. Dig.* 37(3):189-197; 1975.

5249 ROENTGENOLOGICAL STUDY OF THE STATUS OF THE BILE DUCTS IN CHILDREN DURING AND AFTER INFECTIOUS HEPATITIS. (Rus.) Zaytseva, R. V.; Ryabova, L. S.; Voronova, G. M. (Leningrad Medical Inst. Pediatrics, Leningrad, USSR). *Pediatriia* (6):50-51; 1975.

5250 ETIOLOGIC DIAGNOSIS OF CHOLESTATIC JAUNDICE BY MINI-LAPAROTOMY. (Fre.) Blanc, D.; Preel, J. J.; Hardouin, J. P.; Hay, J. M.; Maillard, J. N. (Hopital Louis Mourier, 178, rue des Renouillers, F 92700 Colombes, France). *Nouv. Presse Med.* 5(16):1065; 1976.

5251 COMBINED RADIOMANOMETRIC AND HISTOLOGICAL EXAMINATIONS IN CONNECTION WITH INTERVENTIONS ON THE AMPULLA OF VATER. (Ger.) Boeckl, O.; Zimmermann, G. (No affiliation given). *Z. Gastroenterol.* 14:243; 1976.

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AGE. (Ger.) Schulz, H.-J.; Dietze, F. (I. Medizinische Klinik, Bereich Medizin, Humboldt-Universitat, 104 Berlin, Schumannstrasse 20/21, E. Germany). *Z. Aerztl. Fortbild. (Jena)* 69(9):465-469; 1975.

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5286 SYNOPSIS OF THE PROCEEDINGS OF SESSION 3: MEDICINAL DISSOLUTION OF GALLSTONES. (Ger. Leuschner, U. (Zentrum der Inneren Medizin der Universitat, Theodor-Stern-Kai 7, 6000 Frankfurt 70, W. Germany). *Z. Gastroenterol.* 14:212-220; 1976.

See also, 4761, 4762, 4763, 4764, 4765, 4767, 4785, 4790, 4793, 4797, 4799, 4800, 4802, 4820, 5048, 5084, 5106, 5109.

GENERAL

5287 SALINE LAVAGE: A RAPID, EFFECTIVE, AND ACCEPTABLE METHOD FOR CLEANSING THE GASTROINTESTINAL TRACT. (Eng.) Levy, A. G.; Benson, J. W.; Hewlett, E. L.; Herdt, J. R.; Doppman, J. L.; Gordon, R. S., Jr. (Natl. Inst. Arthritis, Metabolism, Digestive Diseases, Natl. Insts. Health, Bethesda, MD 20014). *Gastroenterology* 70(2):157-161; 1976.

The efficacy of saline lavage (without dietary restrictions or cleansing enemas) as a gentle, alternative method for cleansing the bowel in preparation for diagnostic studies was examined and compared to the standard castor oil method of bowel preparation. Lavage cleansing was preferred by 16 of 21 patients who had previously experienced a castor oil preparation; 2 patients expressed no preference, and 5 patients preferred castor oil preparation. Although 11% of patients could not consume an adequate (4-1) lavage volume, there was no significant difference in the preparation success rate between the remaining lavage patients and the castor oil patients. Total preparation time for lavage (3 ± 1 hr) was 60% less than for castor oil. The anticipated dehydration produced by castor oil and the hydration produced by lavage were confirmed. No significant changes were noted in serum electrolytes with either method of preparation. Additional early studies are promising for the lavage method when used in inflammatory bowel disease patients and as a cleansing preparation for colonoscopy.

5288 SOMATOSTATIN AND SERUM GASTRIN IN NORMAL SUBJECTS AND IN PATIENTS WITH PERNICIOUS ANAEMIA, CHRONIC LIVER AND RENAL DISEASE. (Eng.) Le Roith, D.; Vinik, A. I.; Epstein, S.; Baron, P.; Olkenitzky, M. N.; Pimstone, B. L. (Groote Schuur Hosp., Cape Town, South Africa). *S. Afr. Med. J.* 49(39):1601-1604; 1975.

The effects of somatostatin on basal gastrin levels were studied in 4 patients with pernicious anemia, in 6 patients with chronic renal disease, in 6 patients with liver disease, and during sequential arginine/insulin-stimulated gastrin release in 12 normal subjects. Basal gastrin concentrations were normal (10-50 pg/ml) in the controls, in the patients with liver disease, and in four of the patients with renal disease; somatostatin (200 µg, i.v., over 20 min) had no effect on gastrin levels in these patients. In the remaining patients, the basal gastrin levels were raised (152 pg/ml mean in patients with pernicious anemia), and the gastrin levels in these patients were significantly inhibited by somatostatin (mean, 78.5 pg/ml at 5 min after infusion in patients with pernicious anemia). The half-life of somatostatin in these patients was 3-4 min. Arginine infusion (10 mg/kg/min, 30 min) caused an insignificant increa in serum gastrin, whereas hypoglycemia induced by the injection of insulin (0.1 U/kg) significantly stimulated gastrin release. The increase in gastrin release caused by arginine infusion was not affected by somatostatin, but the increase caused

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by insulin was inhibited by somatostatin. The suppression of raised gastrin concentrations in the patients with pernicious anemia or chronic renal disease suggests that the hyperactive G cell is suppressible by somatostatin.

5289 SPONTANEOUS PERITONITIS OF CIRRHOSIS DUE TO CAMPYLOBACTER FETUS.

(Eng.) Targan, S. R.; Chow, A. W.; Guze, L. B. (Harbor General Hosp., 1000 W. Carson St., Torrance, CA 90509). *Gastroenterology* 71(2):311-313; 1976.

An unusual case of spontaneous peritonitis due to *Campylobacter fetus* infection in a patient with cirrhosis is reported. The patient, a 59-yr-old man with a history of alcohol abuse, presented with diarrhea, anorexia, vomiting, dull abdominal pain, and increasing abdominal girth. Paracentesis revealed hazy, clotted fluid. Empiric antimicrobial therapy was begun with gentamicin and clindamycin (80 and 600 mg, resp., i.v. every 8 hr). Although blood and urine cultures were sterile, the peritoneal fluid grew a microaerophilic, gram-negative, curved bacillus with a unipolar single flagellum, subsequently identified as the *C. fetus* subspecies, *intestinalis*. The antibiotic therapy was discontinued on the 10th hospital day, and the patient died on the 15th day; the autopsy revealed advanced Laennec's cirrhosis, secondary hemochromatosis, and chronic prostatitis. *C. fetus* has been increasingly associated with cirrhosis and other human diseases, but this is apparently the first report of it being associated with spontaneous peritonitis. The infection is characteristically relapsing in nature and requires protracted antimicrobial therapy.

5290 UNFAVORABLE EFFECT OF ATROPINE-DIPHENOXYLATE (LOMOTIL) THERAPY IN LINCOMYCIN-CAUSED DIARRHEA.

(Eng.) Novak, E.; Lee, J. G.; Seckman, C. E.; Phillips, J. P.; DiSanto, A. R. (Upjohn Co., 7000 Portage Rd., Kalamazoo, MI 49001). *JAMA* 235(14):1451-1454; 1976.

In a double-blind, randomized study, the effect of atropine-diphenoxylate (Lomotil) therapy on lincomycin-induced diarrhea was studied in 200 normal men. The subjects received one of the following treatment combinations: (1) lincomycin (600 mg) and two placebo tablets, (2) lincomycin and two tablets of an atropine-diphenoxylate mixture, (3) lincomycin and two tablets of an aspirin-phenacetin-caffeine (APC) mixture with codeine phosphate (APCC, 0.06 g), (4) lincomycin and two tablets of APC mixture, or (5) saline (2 ml) and two placebo tablets. Each subject received four i.m. injections of lincomycin or saline and four p.o. doses of one of the treatment combinations daily for 3 days. The group receiving lincomycin with atropine-diphenoxylate (11/40) and the group receiving lincomycin with APCC (14/36) had a higher incidence of diarrhea from day 4 through day 6, followed by the groups receiving lincomycin with APC mixture (9/39), lincomycin with placebo (8/39), and saline with placebo (1/38). The difference was statistically significant ($p<0.05$) on days 3, 4, and 5. From day 4, the mean daily total and loose stool counts for the group receiving lincomycin with atropine-diphenoxylate were about twice that of the mean of the groups receiving placebo ($p<0.05$). The group receiving lincomycin with placebo had the lowest incidence (0/37) and the group receiving lincomycin with APCC had the highest incidence (7/34) of nausea and loss of appetite (10/36) among all the treatment groups. Decreased intestinal motility from atropine-diphenoxylate or codeine may increase the contact time between the lincomycin (or its metabolites) or some developing toxic substances and the mucosal epithelium. The use of atropine-diphenoxylate or codeine in treating lincomycin-induced diarrhea is questionable.

5291 ANTIDIARRHEAL AGENTS IN THE TREATMENT OF ACUTE DIARRHEA IN CHILDREN.

(Eng.) Portnoy, B. L.; DuPont, H. L.; Pruitt, D.; Abdo, J. A.; Rodriguez, J. T. (Univ. Texas Medical Sch., P.O. Box 20708, Houston, TX 77030). *JAMA* 236(7):844-846; 1976.

The efficacy of antidiarrheal agents was evaluated in 80 children (aged 3-11 yr) with acute diarrheal illness. The children were hospitalized after experiencing an average of 3.5 days of diarrhea, and were treated for 2 days with one of five agents (16 patients each): kaolin-pectin suspension concentrate, kaolin suspension, pectin suspension, diphenoxylate-atropine liquid, or placebo. Although the patients receiving kaolin-pectin produced stools that tended to be more formed than those of the placebo-treated group patients, the study did not demonstrate any effect by any of the agents in influencing the frequency of bowel movement, the water content of the stools, or the weight of stools. The kaolin-pectin suspension and diphenoxylate-atropine liquid do not appear to be useful in the relief of acute nonspecific diarrhea in children.

5292 FECAL STEROIDS IN DIARRHEA. I. ACUTE SHIGELLOSIS.

(Eng.) Huang, C. T. L.; Woodward, W. E.; Hornick, R. B.; Rodriguez, J. T.; Nichols, B. L. (Baylor Coll. Medicine, Houston, TX). *Am. J. Clin. Nutr.* 29(9):949-955; 1976.

The hypothesis that altered bile acid metabolism may play a role in the association between acute diarrheal episodes and malnutrition was tested. Fecal bile acid and neutral sterol patterns of five healthy men, who were challenged by a virulent *Shigella flexneri* 2a (M42 43) strain and developed dysentery, were studied. Cholic acid was increased from 1.9 ± 0.4% of total bile acid in the feces before infection to 14.5 ± 2.1% during diarrhea ($p<0.001$). Chenodeoxycholic acid also was increased from 3.2 ± 0.7 to 8.7 ± 3.2% in diarrhea, but the difference was not statistically significant. Deoxycholic and lithocholic acids constituted 34.1 ± 4.1 and 40.5 ± 2.8%, resp., of total bile acid in the subjects before the induction of diarrhea, compared to 13.9 ± 2.5 and 24.8 ± 2.5% for the same subjects during diarrhea ($p<0.005$). The total excretion of bile acids was higher in diarrhea than that in controls, but the difference was not statistically significant. In the neutral sterol fraction, unmodified cholesterol was increased during diarrhea (86.2 ± 8.7 versus 25.0 ± 4.8% of total cholesterol metabolites in controls, $p<0.001$). Coprostanol was decreased in shigellosis (12.2 ± 8.2 versus 65.8 ± 4.7% in controls, $p<0.001$). Epicoprostanol, coprostanone, and unidentified cholesterol metabolites also were reduced in shigellosis. The effect of diarrhea on the plant sterols was not as consistent; however, unidentified plant sterols were reduced significantly in shigellosis stools. Total excretion of cholesterol metabolites and plant sterols was 6.8 ± 1.7 and 0.6 ± 0.2 mg/kg/day, resp., in shigellosis, which was not significantly different from the corresponding values for controls. One subject's stool samples were studied during infection for the sequence of bile acid alteration. A progressive reduction of bacterial activity upon fecal steroids was evident following the initial diarrheal episode. The production of coprostanol was correlated with 7α-dehydroxylation of cholic acid ($r=0.937$, $p<0.001$) and chenodeoxycholic acid ($r=0.755$, $p<0.01$). The lack of effect of shigellosis on total fecal sterol excretions differs from previous observations. The available information suggests that several mechanisms are able to alter the bacterial degradation of intestinal steroids.

5293 DIFFUSE EOSINOPHILIC GASTROENTERITIS ASSOCIATED WITH PSEUDOPOLYPS. (Ger.) Fehr, H. F. (Medizinische Klinik, Kantonsspital, CH-5001 Aarau, Switzerland). *Z. Gastroenterol.* 8(5):534; 1975.

A case of eosinophilic gastroenteritis associated with pseudopolyps and with pathological changes in the fundus and corpus of the stomach is described. Clinically extreme emaciation was present. Laboratory tests showed decreased total protein (5.3 g%) and slight eosinophilia (4.5-6.5%). The pentagastrin test revealed complete anacidity and an hourly secretion of 58 cm^3; radiologically inelastic stomach wall, filling defects, and suspicious ulcer formation in the fundus and corpus were present. Endoscopy revealed bleeding, ulcerative tumor-like polyps in the fundus and corpus, with only a few tiny polyps in the antrum and duodenum, and atrophic mucosa. Biopsy revealed inflammatory histiocyte polyps with diffuse eosinophilic infiltration. The symptoms ceased at first without therapy; their recurrence 1 month later was treated successfully with corticosteroids.

5294 DOES HYPERPARATHYROIDISM CAUSE HYPERGASTRINEMIA? (Eng.) Wilson, S. D.; Singh, R. B.; Kalkhoff, R. K.; Go, V. L. W. (Medical Coll. Wisconsin, 8700 W. Wisconsin Ave., Milwaukee, WI 53226). *Surgery* 80(2):231-237; 1976.

To define the relationship between hyperparathyroidism (HPT) and gastric function, 31 patients with HPT were studied before and 2-25 months after parathyroidectomy. The gastrin response to a standard test meal (STM), the basal acid output (BAO), and the peak acid output (PAO) were determined. Parathormone and calcium were elevated (mean=11.3 mg% for calcium and 85 µl Eq/m for parathormone) in all patients and returned to normal (9.3 mg% and 28 µl Eq/m, resp.) following parathyroidectomy. The mean fasting gastrin concentration (195 pg/ml), mean integrated gastrin response (IGR) to feeding (9.9 ng/ml x 60 min), mean BAO (3.6 mEq), and mean PAO (24.1 mEq) were not changed significantly by parathyroidectomy. There wa no significant correlation between gastrin concentration or gastrin response to feeding and gastric acid secretion. Eight of 31 HPT patients had fasting gastrin concentrations above normal preoperatively, which remained so postoperatively. Hypergastrinemia in six of these eight patients was explained by the Zollinger-Ellison syndrome or chronic atrophic gastritis. The hypothesis that peptic ulcer disease seen in some HPT patients is the result of calcium-induced hypergastrinemia causing gastric hypersecretion is not supported by these results.

5295 ACUTE GASTRODUODENAL LESIONS RELATED TO SEVERE SEPSIS. (Eng.) Le Gall, J. R.; Mignon, F. C.; Rapin, M.; Redjemi, M.; Harari, A.; Bader, J. P.; Soussy, C. J. (Henri Mondor Hosp., Creteil, France). *Surg. Gynecol. Obstet.* 142(3):377-380; 1976.

The incidence and role of sepsis in acute gastrointestinal lesions were studied in 30 patients. Nineteen fibroscopies were performed in 14 patients with sepsis, and 23 fibroscopies were performed in the 16 patients without sepsis. Lesions of the gastroduodenal mucosa were classed into five increasing stages: stage 0, normal; stage I, extensive erythematous, purpuric, macular lesions; stage II, discrete and superficial erosions; stage III, one or several gastric or duodenal ulcers without bleeding; and stage IV, one or several bleeding ulcers. Six of the 19 fibroscopies performed in the patients with sepsis showed stage I or II lesions, and 13 showed stage III or IV lesions. In the first day of septicemia, all lesions were in stage I or II. From the fourth day on, the lesions were in stage III or IV, and by the sixth day of septicemia, the lesions were in stage IV in all patients. Of the 23 fibroscopies in the patients without sepsis, 12 showed a normal mucosa, and 11 showed stage I or II lesions. The differences in the incidence and severity of gastroduodenal disease between the two groups were highly significant ($p<0.001$). The incidence of acute gastroduodenal lesions in all 30 patients could not be correlated with an earlier episode of shock, respiratory failure, renal failure, or the presence of gastric biliary reflux. The data suggest that severe sepsis *per se* can provoke acute damage to the mucosa of the stomach.

5296 PRINCIPLES OF CORRECTION OF SOME HOMEOSTATIC DISTURBANCES IN ACUTE INTESTINAL INFECTION IN CHILDREN, AGED UNDER ONE YEAR. (Rus.) Bondareva, N. V.; Malkovetz, G. I. (Belorussian Inst. Postgraduate Training Physicians, Minsk, USSR). *Vopr. Okhr. Materin. Det.* 20(9):12-16; 1975.

5297 PLASMA POTASSIUM CONTENT IN ACUTE INTESTINAL INFECTIONS. (Rus.) Nikiforov, V. N.; Koroteev, A. V. (Central Inst. Postgraduate Training Physicians, USSR Ministry Health, USSR). *Klin. Med.* 54(2):95-96; 1976.

5298 FUNCTIONAL SPECIFICITY OF THE GASTROINTESTINAL TRACT IN FOOD INFECTION. (Rus.) Mikhailova, Yu. M.; Saratovtseva, N. I.; Melnikova, L. G.; Rudakova, L. P.; Gorfinkel, R. Ya. (Saratov Medical Inst., Saratov, USSR). *Sov. Med.* (5):53-57; 1975.

5299 AMYLOIDOSIS AND GASTROINTESTINAL PATHOLOGY. (Fre.) Godeau, P.; Frances, C.; Le Charpentier, Y. (Hopital de la Pitie, 47, boulevard de l'Hopital, F 75634 Paris Cedex 13, France). *Arch. Fr. Mal. App. Dig.* 65(1):5-8; 1976.

5300 THE CHOLERA SYNDROME--PATHOGENESIS AND PATHOGENS. (Ger.) Muller, H. E. (Staatl. Medizinaluntersuchungsamtes, D-3300 Braunschweig, Hallestrasse 1, W. Germany). *Munch. Med. Wochenschr.* 118(2):27-30; 1976.

5301 ENTEROBACTERIACEAE AND Staphylococcus aureus IN THE ETIOLOGY OF INFANTILE GASTROENTERITIS. (Spa.) Virgilio, R.; Cordano, A. M.; Escobedo, V.; Escobedo, M. E. (Instituto Bacteriologico de Chile, Chile). *Rev. Chil. Pediatr.* 45(1); 41-45; 1974.

5302 DOUBLE-BLIND COMPARATIVE STUDY OF THE THERAPEUTIC EFFECTS OF NEOMYCIN, LACTOBACILLUS AND PLACEBO IN ENTERAL INFECTION WITH ENTEROPATHOGENIC Escherichia coli. (Spa.) Prado, V.; Mimica, I. (Departamento Medicina Experimental, Unidad de Microbiologia, Area Oriente, Chile). *Rev. Chil. Pediatr.* 45(2):143-146; 1974.

5303 ENTERIC FEVER DUE TO Pseudomonas stutzeri. (Spa.) Nunez, C.; Zaror, L.; Rios, R. (Instituto de Microbiologia Clinica, Facultad de Medicina, Universidad Austral de Chile, Valdivia, Chile). *Rev. Chil. Pediatr.* 46(1):60-62; 1975.

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See also, 4769, 4775, 4779, 4781, 4784, 4794, 4817, 4828, 4859, 4861, 4862, 4889, 4900, 4937, 4942, 4943, 4949, 4964, 4980, 4984, 4995, 5006, 5032, 5053, 5139.

GENERAL

Parasitology

5346 PURE FEBRILE FORMS OF HEPATIC AMEBIASIS: REPORT OF 9 CASES. (Fre.) Charmot, G.; Frottier, J.; Trinh, P. H.; Bastin, R. (Hopital Claude-Bernard, 10, av. de la Porte-d'Auvervilliers, F 75019 Paris, France). *Ann. Med. Interne (Paris)* 127(3):265-268; 1976.

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5349 PREVALENCE OF Balantidium coli INFECTIONS IN SWINE FROM SANTIAGO, CHILE. (Spa.) Letonja, T.; Henriquez, A.; Reyes, G.; Zapata, L. (Departamento de Microbiologia y Parasitologia, Universidad de Chile, Casilla 9183, Santiago, Chile). *Bol. Chil. Parasitol.* 30(3/4):88-89; 1975.

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GENERAL

Regional Enteritis

5352 BACTERIAL VARIANTS: ETIOLOGIC AGENT IN CROHN'S DISEASE? (Eng.) Parent, K.; Mitchell, P. D. (Marshfield Clinic, Marshfield, WI 54449). *Gastroenterology* 71(2):365-368; 1976.

The hypothesis that the infectious agent in Crohn's disease may be a bacteriophage-induced L-form or similar variant was tested by culturing operative colonic and small bowel specimens from seven patients, and examining them for L-phase growth by dark field microscopy. Bacterial variants of *Pseudomonas maltophilia* and *Pseudomonas*-like bacteria were recovered from tissues from three successive patients with Crohn's disease and from one patient with clinical and pathological features of both Crohn's disease and chronic ulcerative colitis. Bacterial variants were not cultured from colonic specimens of one patient with classical features of chronic ulcerative colitis and two patients with adenocarcinoma of the colon. The findings suggest that a relation exists between variant bacteria and the pathogenesis of Crohn's disease.

5353 INDICATIONS FOR SURGERY IN CROHN'S DISEASE: ANALYSIS OF 500 CASES. (Eng.) Farmer, R. G.; Hawk, W. A.; Turnbull, R. B., Jr. (Cleveland Clinic Foundation, 9500 Euclid Ave., Cleveland, OH 44106). *Gastroenterology* 71(2):245-250; 1976.

To determine whether the anatomic area of involvement in Crohn's disease is a major determinant in prognosis, data from 500 patients with Crohn's disease who underwent surgery were analyzed. The primary disease locations were: ileocolic, 225 patients; small intestinal, 130 patients; colonic, 127 patients; and anorectal, 18 patients. Indications for surgery were tabulated and compared using statistical analysis. For patients with ileocolic Crohn's disease, the primary surgical indications were internal fistula and abscess, 44%; intestinal obstruction, 35%; and perianal disease, 12%. For patients with Crohn's disease of the small intestine, the primary surgical indications were intestinal obstruction, 55%, and intestinal fistula and abscess, 32%. Patients with colonic Crohn's disease had a significantly more diverse surgical indication, with poor response to medical therapy, 26%; internal fistula and abscess, 23%; toxic megacolon, 20%; and perianal disease, 19%. This study demonstrates that statistically significant differences occur in the surgical indication depending on the location of Crohn's disease. Patients with ileocolic, small intestinal, and colonic involvement have striking differences in clinical course. It is concluded that Crohn's disease is not a homogeneous entity, but should be recognized as having a varying course depending on the clinical pattern.

5354 ELECTRON MICROSCOPIC STUDIES OF VIRAL AGENTS IN CROHN'S DISEASE. (Eng.) Gitnick, G. L.; Rosen, V. J. (U.C.L.A., Center Health Sciences, Los Angeles, CA 90024). *Lancet* 2(7979):217-219; 1976.

Ileal filtrates of patients with Crohn's disease were cultivated in a new tissue culture cell line, continuous rabbit ileum (CRI). CRI cultures were inoculated with filtrates prepared from the ilea of four patients with Crohn's disease and from four patients with normal small intestine. Tissue-culture grown isolates from patients with Crohn's disease were also inoculated. Electron microscopic studies revealed extensive disintegration of ultrastructure and significant membrane abnormalities. Clusters of viral particles were seen in the cultures inoculated with the tissue-culture grown isolates. The particles consisted of a membrane and an electron-opaque core, and their coats were spiculated. The mean particle diameter was 30 nm. No intranuclear particles were seen. The physical chemical properties of this agent, together with its electron microscopic appearance, indicate that this is a picornavirus.

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5355 MAST CELLS AND IMMUNOGLOBULIN E IN INFLAMMATORY BOWEL DISEASE. (Eng.) Lloyd, G.; Green, F. H. Y.; Fox, H.; Mani, V.; Turnberg, L. A. (Microbiological Res. Establishment, Porton, Wiltshire, England). *Gut* 16(11):861-865; 1975.

The numbers of mast cells and immunoglobulin E (IgE)-containing immunocytes in the bowel wall of patients with Crohn's disease or ulcerative colitis were estimated, and the results were compared with those from normal controls. Mast cells were studied in fresh, surgically resected or biopsy specimens. IgE was demonstrated by an indirect immunofluorescence technique using commercially-prepared, unconjugated rabbit monospecific anti-human IgE. Mast cells were easily identified in the submucosa of all specimens by their size, cytoplasmic granularity, and metachromasia. They tended to be localized near the muscularis mucosa. There was a statistically significant ($p<0.001$) decrease in the number of mast cells in both the lamina propria and the submucosa in the ileum of patients with Crohn's disease compared to controls. There were also significant decreases in mast cells in the colon and rectum of patients with Crohn's disease. In patients with ulcerative colitis, there was a moderately significant ($p<0.05$) increase in the mast cell population in the lamina propria and submucosa of both the colon and the rectum. In areas of the bowel involved by Crohn's disease, the ratio of mast cells to total leukocytes declined markedly, while in lesions due to ulcerative colitis, the proportion of the leukocyte population accounted for by mast cells was not significantly altered. In Crohn's disease, there was a marked fall in the absolute number of IgE-containing immunocytes in the ileal, colon, and rectum specimens. There was only a slight decline in IgE-containing immunocytes in colons and rectums affected by ulcerative colitis. The results indicate that there are significant differences between ulcerative colitis and Crohn's disease in respect to the mucosal populations of mast cells and Ig-containing immunocytes.

5356 THE SUBPOPULATIONS OF CIRCULATING WHITE BLOOD CELLS IN INFLAMMATORY BOWEL DISEASE. (Eng.) Thayer, W. R., Jr.; Charland, C.; Field, C. E. (Rhode Island Hosp., Providence, RI). *Gastroenterology* 71(3):379-384; 1976.

To determine whether there is a decrease in the number of circulating thymus-derived (T) cells in inflammatory bowel disease (IBD), a detailed analysis of the lymphocyte species was carried out in 31 patients with Crohn's disease (CD) and 27 patients with ulcerative colitis (UC). There were 13 CD patients with only small bowel involvement called regional enteritis, and 18 who had some degree of colonic involvement, called ileocolitis. Similarly, the UC group was subdivided into 9 patients with disease confined to the rectosigmoid area, called proctosigmoiditis, and 18 with more extensive involvement, called universal colitis. Thirteen patients who had undergone previous colectomy and ileostomy and 78 healthy age- and sex-matched controls were also studied. Although there was no increase in the absolute number of lymphocytes in patients with ileocolitis and universal colitis, the percentage of lymphocytes was decreased because of an increase in both polymorphonuclear leukocytes and monocytes. In IBD and its subgroups, the mean T lymphocytes, determined by the sheep RBC rosette technique, were not significantly different from the controls either in percentage or absolute number. Furthermore, no difference was noted between UC and CD. There seemed to be a subpopulation of patients with UC or CD whose T cells were reduced below 1 standard deviation of the mean, however. No difference in the number of immunoglobulin-bearing bone marrow-derived (B) cells was seen; however, when the B cells were enumerated by their ability to rosette with antibody-complement-coated RBC, a marked decrease in percentage ($p<0.001$) and absolute number ($p<0.0005$) of B cells was found relative to the control population. The decrease bore a direct relation to the severity of the disease process and, although more marked in patients with UC, was also present in CD.

5357 GASTRODUODENAL CROHN DISEASE. (Eng.) Tootla, F.; Lucas, R. J.; Bernacki, E. G.; Tabor, H. (William Beaumont Hosp., 3601 W. 13 Mile Rd., Royal Oak, MI 48072). *Arch. Surg.* 111(8):855-857; 1976.

Experience with three young women (aged 18-24 yr) with upper gastrointestinal tract symptoms associated with Crohn's disease is described. All three patients required operation for relief of symptoms. Two operations were performed for gastric outlet obstruction, and one for massive hemorrhage. All patients had roentgenographic or gastroscopic evidence suggestive of Crohn's disease, and in each, the diagnosis was confirmed histopathologically. The operative procedures consisted of distal gastrectomy in two cases and gastrojejunostomy in the third. All three patients have or have had evidence of Crohn s disease of the small intestine, and none of them responded to medical management. In the most recent case, medical management included i.v. hyperalimentation. Experience with these cases suggests that symptomatic involvement of the stomach in Crohn's disease will not respond to medical treatment and will require surgical measures for relief.

5358 URETERIC OBSTRUCTION COMPLICATING CROHN'S DISEASE IN THE TERMINAL ILEUM. (Eng.) Fasth, S.; Filipsson, S.; Hulten, L.; Lindhagen, J. (Sahlgrenska sjukhuset, Univ. Goteborg, Goteborg, Sweden). *Acta Chir. Scand.* 142(3):275-277; 1976.

Three cases of obstructive hydronephrosis secondary to Crohn's disease in the terminal ileum are presented. The first patient, a 52-yr-old man, was found at laparotomy to have a mass involving the terminal ileum and its mesentery and extending into the retroperitoneal tissue; the right ureter was adherent to this mass. The patient made an uneventful recovery after the ureter was dissected free, the diseased intestine was resected, and an end-to-end ileoascendostomy was made. The second patient, a 27-yr-old woman, had a prestomal recurrence of Crohn's disease 4 yr after proctocolectomy and ileostomy. An advanced transmural intestinal inflammatory reaction was found in the distal 50 cm of ileum, and the inflammatory process extended into the mesentery and the paraintestinal and right retroperitoneal space, where a cicatrical fibrous tissue mass had formed. The right ureter had been severed where it passed through the mass. An end-to-end anastomosis was performed between the two ureteral ends; nephrectomy was subsequently performed because of local infection and pyonephrosis. In the third patient, a 27-yr-old woman, excretory pyelography showed an extrinsic obstruction of the right ureter at the level of the pelvic brim, associated with a considerable hydroureter and hydronephrosis. The excretion was considerably delayed on the right side. At laparotomy an inflammatory mass involving the ileum, cecum, ureter, right ovary, and fallopian tube was observed. The ureter was successfully dissected free, and subtotal colectomy, resection of the ileum, and an end-to-end ileosigmoid anastomosis were performed. Urinary tract symptoms were absent in all patients. The third case illustrates the importance of a preoperative i.v. urogram; this procedure in the second patient may have lessened the risk of ureteral damage by laying the basis for a more careful technical approach.

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5359 MULTIPLE SUPERFICIAL GASTRIC EROSIONS DUE TO CROHN'S DISEASE OF THE STOMACH. RADIOLOGIC AND ENDOSCOPIC DIAGNOSIS. (Eng.) Laufer, I.; Trueman, T.; deSa, D. (McMaster Univ. Medical Center, Hamilton, Ontario, Canada L8S 4J9). *Br. J. Radiol.* 49(584):726-728; 1976.

The case of a 21-yr-old man with Crohn's disease involving the stomach and duodenum is presented. The patient had a 4.5-yr history of ankylosing spondylitis. Double contrast radiography of the stomach and duodenum showed multiple superficial gastric erosions and a duodenal ulcer. Changes typical of Crohn's disease were seen in the terminal ileum. Endoscopy revealed numerous superficial erosions in the stomach and duodenum, and biopsies of the stomach showed granulomatous inflammation, consistent with Crohn's disease. These lesions were similar to those seen in the colon in the early stages of granulomatous colitis, and it is likely that this represents the early stage of Crohn's disease in the stomach. With increasing application of double-contrast radiography and endoscopy, these lesions may be found more frequently.

5360 EXCLUSIVE COLIC LOCALIZATION OF CROHN'S DISEASE. (Rum.) Tureu, N.; Oancea, N.; Laky, D. (Spitalul "Dr. Stefan Stinca," Bucharest, Rumania). *Chirurgia (Bucur.)* 25(3):211-215; 1976.

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5362 OPERATIVE TREATMENT OF ULCERATIVE COLITIS, CROHN'S DISEASE AND DIVERTICULITIS. (Ger.) Heberer, G.; Hoffmann, K.; v. Bary, S. (Chirurgische Klinik der Universitat, 8000 Munich 2, Nussbaumstrasse 20, W. Germany). *Dtsch. Med. Wochenschr.* 101(16): 605-611; 1976.

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